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FIELDS OF PSYCHOLOGY

A STUDY OF MAN AND HIS ENVIRONMENT

by

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PREFACE

The author's major purpose in writing this book was to review the more outstanding problems, methods, and materials of several gross divisions, or fields, of psychology. He trusts that the book will provide a form of orientation for those students who wish a deeper understanding of the subject matter of psychology, but who are unable to study those specialized courses in each of which a more adequate treatment of the materials of a particular field is to be found. In larger departments, where there are many students who do not plan to continue their psychological studies, but who, nevertheless, desire a fuller understanding of the subject matter of psychology than an elementary course can possibly provide, and in smaller departments, where it is impossible to offer a diversified curriculum, a general treatment of this sort is useful. Moreover, the author has discovered that a survey of the materials of the several fields of psychology tends to quicken and to precipitate the interests of many students who are thus led to further work in the more particularized subjects of the advanced curriculum.

On the whole, the point of view of the book is functional. While this warp runs throughout the book, the author wishes to make clear that he has not attempted to develop a particular systematic position at the expense of clear exposition and scientific thoroughness. In fact, he has tried to be devoted to several systems, but strictly wedded to none. An examination of the book should reveal, moreover, the major emphasis which has been placed upon the biological relations of psychology. The writer has earnestly sought to construct an adequate approach to this study by way of biology. He has discovered that far too often students of psychological interests have little understanding of the major biological functions of the organism. Throughout the whole book he has steadily regarded psychology as a biological science. But this must not be taken to mean that he has disregarded the autonomous status of psychology by attempting to write, for example, a *physiology* of the organism with some psychological implications. He has tried to write a psychology—not a physics and chemistry of the individual. This means that he has not sought to force the descriptive

categories and concepts of the inorganic sciences upon a dynamic organism.

Following an attempt, in the first chapter, to make clear the nature of scientific methods and scientific interrelationships, a brief discussion is given of various ways of studying the psychological organism. In these, no attempt has been made either to exaggerate or to minimize the importance of various points of view in psychology. In Part II, an approach is made to the study of the development of the animal, the race, and the individual, by way of a brief consideration of some fundamental problems of evolution. The more salient features of animal, racial, and individual development are then reviewed. In connection with the topic of individual development, a brief treatment of some problems of socialized behavior is given. In Parts III and IV, the organism is regarded in its more individualized aspects—as a male or a female with a particular racial history. Here, too, the psychological problems of behavior in the school room, the shop, the marketplace, the court room, the insane asylum, and the clinic are considered.

The author wishes to make it perfectly clear that he has tried to provide sufficient material to meet the needs of the most exacting instructor. The subject-matter of this book has been used in mimeographed form at the University of Illinois with several hundred students. In this manner it has been given a fair teaching test. As a result, only those materials have been included which could be covered during the course of one semester. Each instructor who uses this book will decide, of course, whether he wishes to cover the entire book, assign some parts merely as reading material, or omit parts. It has been the author's intention to present a range of subject-matter so wide as to make unnecessary the use of supplementary reference material.

An attempt to write a book upon a series of topics as broad and as diversified as the fields of psychology taxes one's resources and reveals one's weaknesses. The author has sought to write authoritatively upon several topics, each of which is so large that years of study might well have been given to it. A frank admission of weaknesses is made in order to give as full acknowledgement as possible to the sources drawn upon for strength. Authorities in the several fields considered have been repeatedly cited in this book. The writer would not be content to offer to the student a book which lacked such an authoritative background, for it is his opinion that the individual who seeks an understanding of psychology should be led to appreciate the contributions of those men who are outstanding in their respective fields. Although an

attempt has been made, from time to time, to acknowledge this indebtedness, it is again expressed here.

Other obligations, too great to discharge, must be acknowledged. The writer wishes to recognize his indebtedness to those individuals who have given so generously of their time and aid. Among those who have read the manuscript, either in part or in whole, or who have used the book in mimeographed form, I mention Professor John A. McGeoch, Head of the Department of Psychology, University of Missouri; Mr. Walter Payne, Lyons Junior College; Mr. Harold Gulliksen, University of Chicago; Dr. Paul Thomas Young, Dr. Key Lee Barkley, Dr. Walter McAllister, Mr. R. K. Compton, Miss Grace Moss, Miss Faye Cohen, Miss Ivaline Ireland, Mr. Glenn Finch, and Mr. Seymour B. Stein, of the University of Illinois. Miss Ireland and Miss Cohen gave invaluable help in the preparation of parts of the manuscript. The author is deeply indebted to Mr. Finch and Mr. Stein for their generous aid in the final stages of the book. To the many students who kindly commented upon the style, and the arrangement of parts of the book the writer extends his full appreciation; and to his wife, Ethel Higginson, who worked patiently with him during the entire time, he gives recognition.

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PART I

Introduction and Systematic Positions

CHAPTER I

ORIGIN AND NATURE OF SCIENCE

Introduction

In order that we may properly approach our present study of psychology we must first obtain a certain degree of orientation in the general field of scientific endeavor. We must try to secure some understanding concerning the character of the scientific frame of mind; to discover something of the major objectives and the distinctive methods to which science has given rise; and, finally, to set psychology in its proper relation to the other sciences within this general field.

Fundamental Attitudes. The sciences as organized and systematized bodies of facts secured through the employment of refined methods are a comparatively recent product. The materials of science (the raw environment surrounding man), as well as man himself, considered racially, are, of course, thousands upon thousands of years of age. But only within the last few hundred years has man found occasion to deal with and to reconstruct the materials of the world in the way of science. From the very beginning man was, of necessity, intensely practical. With his meager biological equipment, he had to be, in order to survive under the terrific pressure of his environment. With development, conditions have gradually changed. As he slowly established himself more firmly in his struggle with environmental forces, a certain degree of freedom came, and he was then able to pause a bit and look about him; to consider in greater detail from a somewhat different attitude the world as he found it. He must have been gradually led to speculate in a vague way as to the relations between things; upon the reason for this, about the cause of that. He must have come, too, to look upon the objects experienced about him as sources serving immediately to give him pleasure or to produce pain; to contribute to his good or to his harm. Some things, as he saw them, were no doubt to be left as they were because they were satisfying; while others were to be ignored, avoided or changed. Thus man in time became, as it were, a creature who not only *acted* overtly, depending upon his own bodily needs and the exigencies of the moment, in many different ways toward the objects about him; but one who *speculated* upon these

objects and who *enjoyed* certain of them as well. We can easily conceive of man very early developing toward the world in which he lived three somewhat distinct attitudes or frames of mind. These were the attitude of use or the hand, the attitude of appreciation or the heart, and the attitude of knowledge or the head. Thomson speaks of them as the practical, the feeling, and the understanding "moods." This classification of man's activities has long been recognized. It has served roughly to mark off the man of science with his intellectual inquisitiveness, from the practical man of affairs, interested largely in getting useful things done, who, in turn, is set off from the artist, the poet or the individual who is primarily concerned with the appreciative side of life. We wish to consider briefly the significance of each of these three primary mental attitudes in our present life.

Use. The practical attitude is well illustrated by the dominantly business man of today. He is chiefly concerned with the question of the usefulness of things of the world. It is he to whom we look for the development and the exploitation of the material resources of the land and the water and the air for the material benefit which they offer. He uses the mineral and the forest stores for his industries, the seas for their food and as a means of transportation, the air for sources of energy and rapid travel. His interests run to commerce, to the development of trade, to the conquest of new lands—in fact, to all phases of economic life. The attitude is of very great importance. It is vitally necessary. Yet when it is unduly emphasized, we recognize its undesirable features and its possible dangers. The overly practical man is, too often, wholly intolerant of sentiment; and he will have nothing to do with the abstract problems and the dry theories of the scientist. He is so anxious to keep near to the ground—to live, as he says, in the real world—that he may miss, as one[1] puts it, "the flowers upon the earth, the stars overhead." It is against the intensely earnest business man that the nature lover who wishes to set aside and to preserve in the original state a few acres, here and there, as parks and recreational centers must fight. The business man sees these places merely as potential sources of wealth—in grazing land, in mineral stores, in real estate, or in lumber.

Appreciation. Very early in man's life there must have developed, as we have said, a pleasure not altogether animal-like and not, in the strict sense, of any practical value, in the sight of towering mountains, the far sweep of the plains, the swiftly flowing streams, the brilliance

[1] For a thorough discussion of this general problem, read Thomson, J. A., *Introduction to Science*, 1911.

of the full moon or the splendor of the flaming sunset. Out of such probable simple beginnings, man has developed a highly appreciative, or emotional, attitude which makes possible in most of us a clear enjoyment of beautiful things for their own sake. This attitude stands back of the appeal of the dance, the lure of music, the thrill of tumbling waters or the glow of the fire-side story. It is directly responsible for the creation of values, of judgments of worth, the import of right and wrong, the games of skill and of play, the delights of the opera, as well as innumerable other ways in which we enjoy, or evaluate in a larger sense, the world about us. In speaking of this attitude, Thomson says that it is only by the "culture of the emotional mood . . . that man hitches his wagon to the stars." But this attitude is not without its dangers. Without proper balance it may lead ultimately to maudlin sentimentality of the worst sort or to a mere caterwauling about nature. We have all heard of the story of the Russian lady who wept dolorously over the amorous adventures of the hero in the opera while her waiting coachman froze, chained to his post by duty and by fear. It is this same attitude, very desirable within limits, which carried to excess is largely responsible for so much of the constant agitation against the employment of methods of vivisection in scientific laboratories—as if the life of a guinea pig or a rabbit were worth more than that of a human being!

Understanding. Of these three attitudes—doing, feeling and knowing—we are most concerned here with the last. To this attitude we attribute man's persistent attempts to comprehend the world in a rational, thoughtful manner. When man deliberately seeks to know and understand the cause or the essential nature of a thing or an event he assumes the attitude of knowledge. When in this frame of mind, he does not take as his aim the development and the utilization of the earth's resources. Neither does he intend to enjoy the objects surrounding him. He is primarily desirous of getting at the "go of the thing," the "why" of it. This attitude has given rise to science and to all of those many earnest and unremitting attempts to describe and to understand certain events in a coherent and systematized manner. At no time is the scientific attitude that of appreciation, for it admits of no personal pleasures. Neither is it concerned with the question of practicality, or the use of something. It is really a way of thinking in which values are left behind. It recognizes no good or bad, no high or low in the moral or in the "bread and butter" sense. At the same time, however, it is powerfully provocative of behavior. Men working under it have, in the past, paid at the stake for this attitude of mind

or have labored on, marked by their fellows as fools. The truly scientific mind is so unlike the mind of common sense that some men marvel that others should actually engage in tasks which have no apparent practical value. Not unfrequently they raise such questions as, "What is the use of it all? What good is such work?" To the scientist, however, the fact that such questions are raised is an unconscious betrayal of a lack of understanding of the character of the mental attitude under which he himself labors.[1] The goal of the scientific frame of mind is the acquisition of knowledge or of understanding, for its own sake, and not for any particular practical use. We recognize, of course, that the development of scientific knowledge has been closely accompanied by useful results in myriad forms, such as improved methods of transportation, in sanitation, in the elimination and control of disease, and in labor and time-saving machinery. And the scientist, who has been, in the large, indirectly responsible for much of this progress, is the first to admit, when he assumes the utilitarian and the appreciative attitudes, the great importance of these for the increased happiness of mankind. But he would maintain to the last that Science is a fairly exacting mistress and that she demands, above all, the pursuit of knowledge for its own sake.

All Occur in Life Situations. An interesting fact about these three large attitudes is that they may repeatedly occur in each of our lives from time to time under varying situations.

We know the animal as a representative of such or such a zoölogical group, we *value* and appreciate it as a pet or companion, and we *use* it as a burden bearer and for food. The soil we study; the landscape we enjoy; and the land we compel to yield an income. The heavens themselves furnish the astronomer with materials for study and the mariner with useful points of reference, as well as all of us with the loftiest objects of contemplation that stir the imagination. Each period, each crisis in the world's history, lays its

[1] "The attitude of common sense is the habitual attitude of every-day life, and the man of science, in putting off the old and putting on the new, does not realize the right-about face in the attitude; he seems still to be dealing with the same world that he has always known, and at first the only differences he can see between the old and new knowledge are those in accuracy of statement and systematic organization. It is not until he actually compares the two sets of results that he begins to see the more fundamental difference. Then he finds, for example, no good drinking water or pump, no locomotive whistles or red flags, no beautiful shade trees or gorgeous peacocks in science; he finds instead a synthesis of hydrogen and oxygen, a set of mechanical principles, auditory qualities or frequencies of vibration, visual quality or radiant energy, and living organisms that possess biological resemblances to and differences from, thousands of other organisms; nowhere in science does he find any hint of utility, of beauty or of worth." (*15*, 14.)

own peculiar emphasis upon one or another of the attitudes. The judgment which the historian passes upon peoples and times and civilizations rests in large measure upon the exaggeration or the neglect of value, utility, or knowledge. The period of the Renaissance in Europe is famous for its quickened spirit of appreciation. Italy "kindled at the core" and the northern countries awoke in turn to a new valuation of art, letters and life. Men censure decadent Rome for its bad sense of values when opulence led it to neglect both the utilitarian and the inquisitive attitudes that it might with great license enjoy the spoils of its conquests. The last century was an era of inquiry. The physical sciences advanced in decades farther than they had in whole preceding centuries. Then invention and discovery created new products and new methods of production. Industry developed. Utility was exalted and "efficiency" tended to become an end in itself. So declined the attitude of knowledge before the ideals and the conveniences of utility.

All men, then, seek to know, to appreciate, and to use. No one of the three attitudes is to be set above the others, as no one of them can properly take the place of the others. The normal course of life includes the appropriate assumption of each in its proper place. The sentimentalist is a person who abuses his appreciative attitude, adopting it upon occasions when he should either know or use. The man who is engrossed in business is tempted to neglect human and artistic values and to underrate learning. The pursuit of knowledge unrelieved by appreciation makes the pedant. The educated person, like Aristotle's "large-minded man," is the well balanced individual who gives to each of the demands of human life its due—who understands when knowledge is required, who appreciates when judgments of worth, whether aesthetic, moral, economic, social, or religious, are in place, and who uses the "goods" of the world with a proper regard for their values and with an intelligent conception of their nature (*1*, 14).

Thus we see that although an individual may hold at certain times to the attitude of the scientist, at other times he may be quite a different sort of creature. He may be an epicurean, a digger of ditches, a writer of verses or a worshipper. To the wrong opinion that a man may be set down as always holding to one of these attitudes, we may attribute the tendency on the part of some to accept as somewhat infallible the statements of an individual who is unquestionably outstanding in one field upon subjects wholly remote from that field, and in which the individual has shown no outstanding merit. Men thus turn to the genius in electricity or to the brilliant engineer for an authoritative statement upon matters of mental testing, the race question, religion, evolution, settlement of international debt and the perpetuation of world peace. Pearson, in discussing this point in his *Grammar of Science*, writes: "It by no means follows that because a man has made a name for himself in the field of natural science, his judgment on such

problems as Socialism, Home Rule, or Biblical Criticism will necessarily be sound. They will be sound or not, accordingly as he has carried his scientific method into these fields" (*8*, 81). It is indeed to be regretted that only too often we find scientifically minded individuals speaking out of their fields.

We wish to give two final illustrations to make clear this distinction among the attitudes. Take, for example, the matter of eating. We can say that when one purposefully partakes of food, either because it affords him pleasure or because it is useful in the maintenance of the vital activities of the bodily organism, the scientific attitude cannot be concerned. On the other hand, one may very well desire to determine the effects of certain organic compounds, commonly known as food, upon some bodily structure or activity of the organism, and so introduce them into the organism. Such behavior would be scientific. Or, again consider the attitude of the chemist toward the every-day cow. The creature for him is neither food, friend nor factory but instead an organism composed of simple chemical elements organized into a great many unstable compounds.

SCIENTIFIC METHOD

The sciences grew out of the understanding frame of mind. And their development at every step has been peculiarly characterized by the general employment of definite forms of procedure commonly known as the scientific method. In truth, it should be clearly understood that a study is made scientific by the way in which the materials are secured and not by any peculiar character of the materials themselves. To the scientist, all material is of equal significance; chemical material, for instance, is not more scientific than psychological material. The final test as to whether something is or is not scientific is found in the method of procedure. It should be obvious that of two individuals who may treat the same object, or the same experienced event, the way of the one may be scientific, the other unscientific. The universe, in whole or in part, is grist for the mill of the scientist.[1] His quest may range from the loftiest aspirations of man to the simplest operations of the one-celled animal; or from the far-reaching galaxies of the skies, as revealed by the enormous telescopes, to the infinitesimally minute structure of the atom. One might truthfully say that, so far as ma-

[1] Thus Pearson tells us: "Wherever there is the slightest possibility for the human mind to know, there is a legitimate problem for science. It claims that the whole range of phenomena, mental as well as physical, is its field" (*8*, 24).

terial goes, nothing under the sun falls outside the province of the scientist.[1]

It should be understood that the methods of the scientist are in no way mysterious. His primary problem of understanding an event or a sequence of events resolves into two main tasks. The one has to do with the manner of collecting his materials or data. The other deals with his treatment of these data or facts according to standard methods and the laws of logic. Each merits some consideration.

THE COLLECTION OF DATA

Observation. The first step in the understanding of some event is the careful and critical observation of the one or more phases of the occurrence. But this is by no means a simple task. Take any passing event that offers an opportunity for accurate observation and see how many *facts* you can set down; how many clean-cut descriptive statements you can produce. If you have been careful, that is, if your data can be checked by others who had equal opportunity for observation, you have, for the moment, been scientific. It is agreed that a scientific observation is of necessity a function of an entire situation. There must be something to be observed and there must be an observer who perceives under a very particular attitude. One sees, hears, touches or smells and the like, from a given point of view and under controlled physical and psychological conditions. What was perceived is then reported in acceptable and standardized terminology. Under the usual conditions of scientific procedure, the observations are made and the description of the materials are given in the experiment.

Experimentation. Now an experiment is neither queer nor mysterious. It does not introduce something peculiar into the observation itself. It serves simply to afford a proper setting for the observation. One might truthfully say that it consists, in part, of the thoughtful and logical preparation for making a controlled series of observations upon some given experienced item—some bit of material or event; and, in part, of the actual process of perceiving. It is observation under conditions in which both the observer, and the thing observed with its context stand under control. The experiment may be relatively simple or quite complex, according to the degree of control exercised and the number of factors to be brought and held under control. We com-

[1] This is not to be taken to mean that the scientist has turned his hand to an investigation of every phase of life; because as yet there are many problems for which the scientist has no adequate methods of attack. They simply do not lend themselves to an attack of a scientific sort.

monly recognize that observers vary in their respective abilities to perceive and to report accurately. Some are less able than others to assume and to maintain a particular point of view. The value, or the degree of reliability, of descriptive reports appears to rest largely upon the type of instruction, or the mental set, under which the observer works. If it is his deliberate intention to secure evidence tending to substantiate some previously accepted position, his results may unconsciously be considerably distorted. In careful psychological work, for example, the subject is *controlled* by giving him very definite instructions as to what he should or should not do. Even under such conditions it appears that undesirable elements creep in. Many of the events to be observed are so very complex that one is taxed to the very limit to note accurately the many phases. Furthermore, one is so accustomed to dealing with assumed physical objects—that is to say, one has the so-called *objectifying* tendency so strongly established in him—that it is indeed difficult to abstract from the physical object and observe the course of experience. Finally, the observer may desire to please the experimenter; or he may wish to contribute something over and above the observation—something more than is called for in the instructions—perhaps an interpretation of the observed phenomenon. Clearly such desires, if given expression, serve to introduce non-scientific elements. In all such cases, the reliability of the results is lessened. To avoid such disturbances, the warning to de-personalize the whole process, to eliminate all individual feeling must be repeatedly sounded. But the warning is indeed difficult to heed. Perhaps it is the inability to lay aside the values of common sense that prevents many persons from becoming scientific.

Experimental Control. The physical conditions of an experiment commonly consist of an arrangement, usually involving apparatus, which aids the observation through the elimination of irrelevant and distractive items. It aids in the description of the things observed by limiting the scope of the describable material. In addition to such means of control, instruments of precision are employed to supplement and to extend the perceptions of the observer. Thus the *X*-ray, the telescope, the amplifier, the microscope, together with a great many other devices enable man actually to enlarge upon and to extend enormously his knowledge of the universe beyond what is presented through the unaided sense departments. At no time, moreover, does the scientist rest content with the results of his perceptions in any given sensory field, if other avenues of knowledge are open. So far as possible, he checks the outcome in one sense department against that of another.

He draws upon standard instruments for purposes of measurement and record, and he treats his findings according to standard statistical methods.

But experimental control means more than all the above. There is the necessity for isolation of material and repetition of observation. Objects and events usually occur under very complex conditions. Each part of the universe is intimately tied up with other parts. In order to secure a careful description of one particular thing, the scientist must seek to remove it to a certain degree from its grosser context; although it must be understood that it is impossible to remove anything from all other things. Only relative independence is ever attainable. Under the most desirable forms of experimental research an item is maintained for a time within a fairly definitely known, although perhaps very complex, setting. In this way the most accurate and straightforward observational reports are made. For great accuracy and thoroughness, it is desirable to observe a given item under many known sets of unlike conditions. A given degree of variation in setting will change the character of the object under examination. It is possible, therefore, by keeping all factors but one unchanged and by varying this in a known manner, to describe in fairly exact detail the resultant changes. Thus an understanding of the characteristic properties of an object is obtained.

In every case, scientific ideals call for repeated observations upon any single aspect; for no one can seriously hope to secure an acceptable description with but a single observation. Repetition tends to iron out slight variations, to permit of a re-check upon any doubtful points and to discover any new properties. Errors and superstition, we know, feed upon reports based upon single observations. The more complex a given object of study, the greater is the necessity for repeated observations. As a rule, psychological objects of observation are very complex. In addition they lie so near our own personal life as to call for the most rigorous control. It is especially desirable under such conditions to observe repeatedly. We recognize that when an individual appears in a psychological laboratory to serve as an observer in an experiment, he is in a definite state of health and that he brings with him the effects of his past, both remote and immediate. He will most likely bring very definite presuppositions concerning the nature of his own particular psychological abilities, of the laboratory and the experimenter. Only through the most careful treatment or control can a reliable measure of such an individual be secured.

Concepts of Science. We must now conclude our discussion of the

methods of collecting scientific data by raising a final question. We must inquire concerning the nature of the materials which the scientist observes. We find our answer at hand. He observes objects and events: physical, chemical, psychological, biological; objects which are stationary, or changing their spatial, temporal or qualitative characteristics. And these objects and events which he observes are accepted as being real, although in his less scientific moments he may be a bit puzzled as to what constitutes reality; or how he is able ever to observe at all. The most striking feature of the objects and events which he observes is that even the very simplest of them presents many sides or exhibits many characteristics or properties. Some of these properties are qualitative while others are purely quantitative. In both cases he must make use of descriptive categories which have common sanction; that is, he must hold to established terminology, until it prove inadequate. It should be recognized that each particular branch of scientific endeavor has its own categories of description and while it is scientifically desirable to reduce all things to simplest terms, considerable confusion arises under our present methods and degree of knowledge by attempting to force rigidly the terms of one science upon the materials of another. While physical concepts work admirably in the field of physics, they unquestionably become inadequate, under present conditions, in the fields of psychology and biology. No one is descriptively able to reduce the psychological functions or activities, such as perception, memory or thinking to physical or chemical terms. We may do well to recognize a high degree of interrelationship between psychological events and physical processes. There may be a dependence of one upon the other, but this in no way implies identity. The psychological is of one order; the physical of another. Clear thinking demands a distinction.

TREATMENT OF DATA

Use of Observation and Logic. At every turn the scientist makes use of his observational abilities under a special interest or from a particular point of view. To the same degree he draws upon logic. There must be a careful, logical preparation preceding his observations in order to make them coherent and systematic. There must be a logical order during the course of his observations; that is, a noting of *this* before *that*—not just mere looking. And there must be a logical treatment of the results of his observations; for science is not a chance collection of random observations. When the data have been secured the task is to analyze, to sift, to select and to arrange those data which

bear upon each particular phase of the object or event examined until at the end the scientist has what one might call a logical construct. That is, he has brought his many observations into a systematic whole, giving a total picture of the thing observed. It is sometimes quite true that individuals gather their data and then find themselves baffled as to how to proceed in their treatment of them. It may well be that they lack the degree of insight requisite for an intelligent understanding of their results. The whole scientific process may then break down because of some weakness in the proper ordering of the data once they have been secured. The work of analyzing, selecting and arranging data, when properly done, leads directly to the formulation of a generalization concerning some correlation or some uniformity between scientific phenomena. Such a generalization, expressible in a few words, may embrace, cover, summarize or integrate a large number and variety of descriptive facts, into the careful gathering and logical ordering of which years of labor may have gone. The formulation of such a generalization or law represents one of the very highest uses to which perception, imagination and thinking may be put in scientific endeavor. It is a distinct intellectual achievement to produce from a mass of data, many of which appear to bear no relation to each other, a common way of viewing all that at the same time makes each significant for the whole. And it is the recognition of the high quality of such a performance that leads us to the expression of the deep obligation due those who have been able to contribute in this manner so much to our understanding. "The most honored names in science are the names of those who have contributed laws" (*13.*) Generalizations provide us with our explanations. We cannot end our discussion of scientific procedure without touching briefly upon the meaning of the term explanation.

Scientific Explanation. If a scientist has established a regularly recurring sequence of physical or psychological events represented, for instance, by some order such as *A*, *B*, *C*, *D*, he maintains that he has explained, let us say, *D* by referring to the necessary antecedent events, *A*, *B*, *C*. For him the explanation is just this sequence and nothing more. In this sense, there actually seems to be no beginning and no end to cause and effect; for one thing must be affected by what precedes and must inexorably affect in turn that which follows. Explanation readily reduces, in this way, to an accurate description of events in the order in which they are perceived to occur. It is a descriptive statement of the totality of conditions, past and present, under which a particular phenomenon appears and in the absence of any one member of which it does not appear. In other words, it is a very accurate ac-

count of the history of an event, although the history may possibly be a statement of something which occurred years before or but a fraction of a thousandth part of a second previous to the event. It should be clearly understood that no scientist ever observes causes in any sense other than this. It can be easily observed that *this* happens, and then *this* happens. We assume that the first *this* is the cause of the second *this*. Instead, then, of asking why a thing happens we might better ask under what *conditions* does it happen. In this sense, the egg explains the bird; the parent explains the egg; the parent is explained by a preceding cell (egg) and so runs the story. It should be understood, of course, that in the *above* illustration the process of development at every step makes significant contributions, so that a careful statement of all the *physical* and *chemical* changes involved would not give a *complete* story of the behavior the bird functioning as a "finished" product. There are the biological and the psychological elements to be considered. This point is admirably made by Thomson. "We watch a bird building its nest. We know that there is an intricate sequence of physical and chemical changes going on in its body. We feel sure that nothing occurs that contradicts any of the established laws of chemistry and physics. We do not know whether a complete chemical and physical description of what occurs is realizable or not. We know that it has not been given. But we feel sure that if it were given *it would not directly help us to understand the bird building its nest.* For that requires a different kind of description—with different concepts which recognize the bird as an historic being with a mind of its own" (*11*, 53).

A great deal of confusion appears to exist concerning the problem of explanation. So often one hears an "explanation" glibly given after a manner of this sort, "Why can't one see colors at night?" "Because of the darkness." "Why does a man smoke?" "Because he has a habit of smoking." "Why does your dog bark?" "Because he has an instinct to bark." "Why can't her friend sleep?" "Because she has insomnia." "Why does the object fall?" "Because of gravitation." And so the list runs. Not a single one of the above illustrations represents a true explanation in the scientific sense. On the other hand, take the first question raised, "Why can't an individual see colors at night?" A more acceptable explanation runs briefly as follows: because of a decrease in the intensity of the illumination below that degree necessary in order to have the cones in the retina stimulated. Since the receptor organs, we point out, become non-functional below a certain degree of light energy and since the functioning of the receptor organs is one

condition always required for experiencing color, no color appears. Man's experiences of the above order are then explicable in terms of a description of (1) the physical agents capable of affecting the delicate sense-organs, (2) physiological structures and their functional properties, (3) the history or the previous activity of the organism. Description of this sort is not easy. It is not surprising that common sense has found a more satisfying, if less scientific, way of explanation.

Our search has shown that science developed out of an attitude which is, racially considered, very old; that its outstanding aim is to know and to understand objects and events for their own sake; that scientific procedure involves observation, under very definitely controlled conditions both in the thing observed and in the observer, together with analysis, synthesis or organization, generalization and explanation. We must now turn to consider briefly the place of psychology among the sciences.

THE PLACE OF PSYCHOLOGY AMONG THE SCIENCES

Significance of Point of View. We pointed out earlier that the nature of the material studied does not make a study scientific. We must point out further that no object or group of objects is the peculiar property of any one science. The same bit of material or the same event may be legitimately studied by several sciences. A man, for example, may be studied by the physiologist, the zoölogist, the chemist, the anatomist and the psychologist, as well as by others. And no one may be accused, under usual conditions, of poaching upon the field of any other. Now what determines the difference among these various sciences? If not the material, then what? As we have said, it is to the point of view that we look for the key. In each of the above-mentioned sciences we find the workers approaching the human organism, dead or alive, from a particular angle—training their glasses, as it were, upon it and drawing their pictures. Each scientist, in fact, abstracts in his own way from the total creature—who can, of course, be known only to the degree to which a composite of all these pictures, taken from these various angles, is secured. Each of these sciences represents an abstraction, and curiously enough, each represents an abstraction from experience. That is, each science represents a certain type of knowledge secured through the use of the experiential reactions of trained workers.[1] Each scientist starts with his experiences. And,

[1] We go to the psychologist for a "workable conception of the mental factors in organic function just as we go to the physicist and the chemist to learn about the

with the exception of the psychologist where a striking difference arises, each disregards the experiencing organism and accepts the outcome; namely, in the above illustration of man, some muscle or gland, some pattern of energies, a chemical compound or spatial arrangement of cells. And even though the physical and chemical sciences may ignore the experiencing organism or take it for granted as something to be placed with the *X*-ray machines, telescopes and the like, we must always bear in mind, however, that without this experiencing organism there would be no science. Now psychology is interested in the actual way in which the organism functions by way of perception, memory, imagination, reasoning and the like to give, in addition to the sciences, the thousands upon thousands of products such as literature, custom, tradition, artistic creation, superstition and so on. The psychologist is interested in the experiential reactions which actually serve as the starting point for all science. In other words, the psychologist is interested in the total reactions of the individual; the other scientists are interested in the *outcome* of such reactions.

Nature of Psychological Material. There are some who unthinkingly maintain that the materials of the physical and the chemical sciences are "real," "tangible," "orderly" in character while the subject matter of psychology is "unreal," "intangible," and follows no known laws. Now it is scarcely logical, to say the least, to accept the actuality and the substance of the outcome of some process and deny the actuality of the means by which the accepted end is really secured. Physical existence actually depends, so it seems, upon the experiencing or behaving human being; upon certain of the psychological activities or functions which serve to give an objective world. According to this way of thinking, psychology becomes a basic science. That is, it deals with

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atomic constitution of matter or to the biological sciences for reliable information about the structure and the history of living creatures. And when our common, rough-and-ready knowledge fails us and we resort to the sciences we must expect a certain amount of sophistication. The world of the chemist is not the world of the cook. The chemist looks upon the universe as vast systems of moving electrons. The atom itself, is, for him, an ordered system of positive and negative electrical charges, some of which are traveling with the velocity of light. No such object ever appears within our ordinary visual range. The world of homely and familiar objects about us does not *look* or *sound* or *feel* as if it were so made. In a similar way, the student of life transforms familiar bodies into vast colonies of minute cells, each one of which is, in turn, exceedingly complex in structure and in its operations. Physics, also, transmutes our gay world of light, heat, sound, and color into a lightless, heatless, soundless universe of vibrating and oscillating changes. Thus each of the sciences, setting out from the phenomenal world of our casual inspection, creates its own interpretation of existence—an interpretation which is consonant with its own point of view and its peculiar problems" (*1*, 11).

those phenomena or events upon the very existence of which the whole fabric of the *known* world seems to depend. According to this same way of thinking, the various sciences stand literally as *abstractions from experience.* And the materials with which they treat become a sort of experiential construction, instead of being actually given in terms of concrete observations.

The relation of the other sciences such as physics and biology and the like to psychology is clearly brought out by Haldane, the English physiologist. According to him, the "world of mathematics and physics, if conceived as a world independent of our perceptions and interests, is only a world of abstractions; and the applications of the principle of relativity in mathematics and physics are beginning to awaken us to this fact. . . . The physical world as still ordinarily conceived is an extremely useful abstraction from, or a partial representation of, what we perceive. Its usefulness will continue and develop in all directions, but it can never form the basis of psychology, since its own basis is psychological" (p. 15). "Scientific knowledge," he tells us, "is objective. What is implied in this description is not that it represents a reality independent of our perception of it (since a reality could never be known) but that it is communicable to others" (p. 16). He then points out, referring more explicitly to his own particular field, that biology is "like physics an abstract science. It deals with abstractions from psychological reality and we can no more base psychology on biology than on physics, since biological conceptions, like physical conceptions, are only abstractions from full psychological experience" (p. 23). He ends by saying that "my conclusion is that the relation of psychology to biology is the relation of a less abstract or partial form of knowledge to a more abstract form. It seems to me that psychology, though less sharply separated off, is the most important form of knowledge and that instruction in it is of overwhelming importance to education" (p. 26).

Psychology, then, as we conceive of it, is concerned with a particular field of intellectual endeavor. It has as its major task that of understanding the activities or functions of the total organism. Concretely speaking, we mean such activities as perception, memory, imagination, action, emotion and the like. And, in order to resolve this task the psychologist must draw freely upon every possible source of information. It is a common experience that observed changes in the vital processes of respiration, circulation, metabolism may be closely followed or accompanied by modification in the psychological functions. The physiologist then stands in a position to advance considerable

information to the psychologist. It should be clear, however, that the task of the physiologist is not necessarily the same as that of the psychologist, not even in behaviorism with its strong emphasis upon the body.

Physiology, we see, has to do, for example, with the operations of the various bodily members such as the stomach, the heart, the lungs, the glandular and muscular members—either as relatively independent units or as highly integrated patterns of many unlike members. Psychology, on the contrary, has to do with any change in the way of experiencing or behaving, under a modification in some part of this integrated physiological system. It does not mean that the methods of either of the two sciences under discussion reduce the materials to the same common denominator. No one has reduced psychological events to the physiological order. And, although there would be no physiology without experience, the fact remains that the items of the physiologist are not of the same order as those of the psychologist. Psychology likewise draws upon neurological facts in its quest for understanding, because it has long been recognized that psychological and neurological events are closely related. A knowledge of certain disturbances of the integrated functioning of the nervous system unquestionably contributes to an understanding of some forms of psychological disorders. At other times, as we know, worry, strain or conflict may seriously disrupt an otherwise smoothly operative nervous system. The physiological chemist with his information concerning the functions and the products of the various glandular systems contributes his share toward a more complete knowledge of human behavior of the psychological sort. Whenever the direction or the course of experience is changed under an unusual increase or decrease in the output of some glandular mechanism, we must seek the chemist for his aid in determining the character and the degree of such mal-functioning. In a similar manner, if it were profitable, we could go to each of the other sciences and show the intimate relationship existing between them and psychology. It all means that the human organism is extremely complex, and that one individual scientist is particularly curious about one aspect while another is interested in other aspects. In this way all sciences may be said to be abstractive, and at the same time mutually supplementary. They sample, as deeply as they can, of any given phenomenon, each from a particular point of view. Since no science is complete within itself or ever attains to a full knowledge about any one aspect of anything, no one can hope to know the whole story about anything—one can only approximate it by securing, in a tolerant

and broad-minded manner, a composite picture from all the individual and specialized views of each and every science.

BIBLIOGRAPHY

1. Bentley, M., *The Field of Psychology.* 1924.
2. Bridgman, P., *The Logic of Modern Science.* 1927.
3. Campbell, N., *What Is Science.* 1921.
4. Cooley, W., *The Principles of Science.* 1922.
5. Haldane, J. S., *Psychology and the Sciences* (Edited by W. Brown). 1924.
6. Hill, A., *An Introduction to Science.* 1900.
7. Lodge, O., *Pioneers of Science.* 1893.
8. Pearson, K., *Grammar of Science.* 1911.
9. Ritchie, A., *Scientific Method.* 1923.
10. Sanford, F., *The Scientific Method.* 1921.
11. Thomson, J. A., *Introduction to Science.* 1911.
12. Titchener, E. B., "*Psychology:* Science or Technology," *Pop. Sci. Mo.*, lxxxiv, 1914, 42.
13. Titchener, E. B., *A Textbook of Psychology.* 1910.
14. Watson, J. B., *Psychology from the Standpoint of the Behaviorist.* 1919.
15. Weld, H. P., *Psychology as Science.* 1927.
16. Westaway, F., *Scientific Method.* 1923.
17. Whitehead, A., *Concept of Nature.* 1920.

CHAPTER II

PSYCHOLOGICAL SYSTEMS

Introduction

In the preceding chapter, we sought to distinguish the scientific from the appreciative and utilitarian attitudes and to point out the essential character of the scientific methods. We saw there that the point of view and the methods employed, and not the materials dealt with, determine the scientific status of any given set of observations. It was also brought out that each scientist starts with his experiential reactions and from a particular point of view formulates his own descriptive account of his phenomena. Each gross division of scientific endeavor represents an abstraction from experience, and within any large division we find still further degrees of abstraction. The field of chemistry illustrates this quite well. Within this large division we find several distinct but closely related branches of chemistry. In the same way we find a division within the field of psychology.

One group of workers approaches from a particular angle the total organism engaged in its many tasks of working, playing, worrying, triumphing, perceiving and the like. They abstract from the total organism and consider, for instance, the mental items—what Woodworth calls the "simple mental reaction" or Titchener the "elemental mental processes." Another group abstracts from the experiencing organism and considers only the bodily mechanism—how it is made and how it operates. A third group finds its point of greatest interest in the unitary or integrative aspect of psychological life. This school accepts both consciousness and bodily activities as descriptive realities, but insists that the most striking and psychologically significant property of these is their unity. The primary task of the psychologist is then to determine and describe the integrated patterns. A fourth group considers the psychological organism not as body and not as mind, but as a structure in which both mind and body items work coöperatively. Here the various activities of the organism such as perceiving, remembering, thinking, action and the like, are considered definitely as psychological functions—as modes of activity in which something is accomplished or some achievement reached by the or-

ganism. There are, then, several forms of psychology. A treatment as brief as the following must necessarily be somewhat abstractive.

Our object here is not to treat exhaustively of any single school, for such a task would take us far beyond the space permitted. Our wish is simply to present a working knowledge of the more outstanding psychological ways of considering the human organism at its work. The student should realize that *differences in point of view* exist. The person of mature interests in psychology should be conversant with these. We have sought neither to magnify nor to minimize unduly any such differences. We are desirous that the student form his own opinion.

THE PSYCHOLOGY OF CONSCIOUSNESS

Structural and Functional Points of View. Of the several varieties of this species of psychology which might properly be considered under this heading, we wish to distinguish for purposes of discussion, two major forms. The one type is commonly known as structural; the other as functional psychology. In the first form mind, or as some would prefer, the sum-total of consciousness, is treated—to use a common analogy—from a purely anatomical standpoint. The descriptive accounts are given in terms of mental composition without reference to any dynamic characteristics. In the second type, however, mind is regarded functional-wise; or, in other words, as an *active*, mental agent or *force* directly engaged in the business of ordering the course of living. In both forms, emphasis is clearly placed upon the purely mental side of the organism. Let us consider the first form.

Structural Psychology

Experience Dependent on Nervous System. To the structural psychologist, the world of experience, or consciousness, is considered as dependent upon a nervous system. Each part and parcel of mind, that is, each of the many simple elementary mental processes, is assumed to have a neurological basis. In terms of the relative importance of the various parts or gross divisions of the nervous system as contributory conditions to mind, three large groups of mental processes are to be distinguished. The external stimulation of the sensory neurones (through the excitation of sensitive sense organs) gives rise to one characteristic class of experiential processes; namely, the sensation. This class of mental elements is primary, in the sense that it appears first in consciousness when we approach it, either from the standpoint of phy-

logeny or ontogeny. The student is familiar, of course, with the usual classification of sensations into visual, auditory, olfactory, gustatory, kinaesthetic, tactual and organic groups. The stimulation of the central nervous system, particularly the cortex, conditions a second large group of processes commonly known as centrally aroused sensation, or better still, as image. The image exhibits the same qualitative variety that is found in the sensation. A third and final group of qualities, the so-called affective processes of pleasantness and unpleasantness, have been assumed, for example, by Titchener, who at the time of his death was perhaps the most outstanding of all psychologists of this school, to be aroused by the stimulation of "free" nerve endings. All three classes of these mental processes exhibit variations in some or all of the following properties: *quality*, *intensity*, *duration*, *extensity* and *vividness*. And in addition, they may stand patterned; they fall into blends, fusions or mosaics.

Analysis Is Stressed. The primary task of the psychologist working under the structural point of view is to break up the myriad of mental complexes found in everyday life into their simple elements; or, as some critics have pointed out, into mental *atoms*. After analysis has been completed, the elements must be subsumed under their proper categories, according to observable likenesses and differences or in terms of their relation to stimulus and receptor organs; and finally, certain psychological and physiological relationships are to be made clear. If there is any single way of characterizing structural psychology it is possibly in terms of its constant insistence upon the employment of the methods of analysis. Titchener, for example, consistently maintained that the fundamental method of scientific psychology must be analysis. It represents the psychologist's very first problem. Thus we are told that the aim of the psychologist has been "to analyze the structure of mind; to ravel out the elemental processes from the tangle of consciousness or to isolate the constituents in a given conscious formation. His task is vivisection; but a vivisection which shall yield structural, not functional, results. He tries to discover first of all what is there and in what quantity—not what it is there for." We are often told, he says, "that our treatment of feeling and emotion, of reasoning, of the self, is inadequate; the answer is that the results gained by dissection of the 'higher' processes will always be disappointing to those who have not adopted the dissector's standpoint. Protoplasm consists, we are told, of carbon, oxygen, nitrogen and hydrogen; but this statement would prove exceedingly disappointing to one who had thought to be informed of the phenomena of contractibility and metab-

olism, respiration and reproduction" (*26*, 450). Again he points out, "Let us be clear, first of all—the matter admits of no hesitation or compromise—that the experimental psychology of the normal adult human mind must take the form of introspective analysis." Or how, indeed, "shall we call a man a psychologist who deliberately turns his back upon the one psychological method in the one field to which that method directly applies?" (*27*, 221).

Contributions of This School. A great deal of careful research has been done within this school, particularly in the fields of sensation, feeling and attention, in the attempt to derive an exact and detailed descriptive statement of the elementary mental processes. It is probably true that we directly owe no small degree of our knowledge of the wide qualitative variety found in experience to this school. Of the facts of sensory processes, of attention and the like, which we find set down in some of our introductory text books, many are to be attributed to the labors of the members of this school. And, while some psychologists may question the value of such facts of the sensory qualities for the general field of psychology, it does appear that the truly scientific attitude cannot very well refuse to accept significant factual material of any sort that may come to its hand. This particular system of psychology has been less fruitful, however, in dealing with the many interesting problems found on every hand in connection with such activities as perception, memory, imagination and the like. And in these inadequacies, we see, perhaps, its greatest weakness. The demands of structuralism, when rigidly adhered to, give analysis and still further analysis. Such disproportionate emphasis upon this one method has served somewhat, so it appears to some, to unbalance this form of psychology. For it becomes, if we may use an analogy, a matter of living essentially by bread alone—which is not a very satisfactory or happy sort of existence. A proper regard for the integrative and the functional aspects of experience, about which we shall later speak, would unquestionably result in a more wholesome state of affairs. In short, the extreme degree of abstraction apparent in structuralism appears to be almost too great for it to thrive lustily. The diet, it would appear, is altogether too thin to sustain life at a very vigorous level.

Problem of Meaning. According to the structural point of view, mental processes do nothing. They neither function in any way to "adjust" the organism more adequately to its environment, nor do they furnish the organism with knowledge. While it is not strictly denied that under certain conditions they may do either, the structuralist is not concerned. Problems of function and of reference lie outside the

legitimate boundaries of his psychological field. The whole affair of meaning, that is the experiencing of all objects and events—in simple, the world about us—is thus thrown out of (or rather denied admittance into) psychological discussion. It is not a psychological matter. Here, again, we have clearly placed before us a very fundamental distinction between this system and a functional one where, for instance, a closer approach may be made toward a more complete conception of the nature of our every-day psychological life. We can better understand now the degree of abstraction found under this point of view. The psychologist here has the task clearly outlined for him. It includes a sharp separation in experience between all meaningful things, such as microbes, stars, ice, fire, man, woman and the like, and the manifold of simple *sensory* or *mental qualities*. Meanings cannot be the materials of psychological study, since only simple processes are legitimate data.

As a form of proof of all this, the structuralist reasons somewhat in this manner. Pressures, lights, sounds and the like must have had existence genetically prior to objects and things; that is to say, the human being could not first experience objects or things. It has pure sensory experience, although it does not know anything about it. The sensory qualities being first, all objects of the outside world—meanings —must come after them. It is evident, then, that the experience of objects and things cannot be intrinsic to, or an essential part of, the sensory qualities themselves. The meaning of such objects must be, on the contrary, wholly extrinsic to, or laid upon the simple mental processes. For mental processes—elementary sensory qualities—exhibit at all times only the constant fixed properties of *quality, duration, intensity* and the like. To illustrate in a simple way how the world of meaning of objects and events about us arises, let us take our ordinary tactual perception of ice; or, for that matter, any object or event which we may perceive or recognize. The meaning which we have of the piece of ice is due, in terms of structural psychology, to the total complex pattern or combination of sensory processes. Now this is to say, speaking attributively or in terms of elementary mental processes, that we have a sensation of coldness together with a fringe of other mental qualities, mainly pressure. Taken altogether, this coldness and this fringe of pressure sensations are, psychologically regarded, our every-day experiencing of ice. There is nothing more to it than this. Sensations are thus transformed into meanings by the *context*. The meaning in every case *is* just the *context*.[1] Expressed in terms of pattern, an ob-

[1] "No sensation *means;* a sensation simply goes on in various attributive ways; intensively, clearly, spatially and so forth. All perceptions mean; they go on, also,

ject is just a passive organization or a *summation* (and largely chance at that) of simple sensory qualities. At no point is there anything dynamic about the affair; nor does the organization or pattern contribute any new qualities or properties.

In evidence of his claim that meaning is mainly a matter of accident, so to speak, of one's personal history, Titchener points out that the meaning of a particular object may be removed from any mental process; that meaning may be added to any simple process; that the same elemental processes may have several meanings and, finally, that the same meaning may attach to several different sensory processes. Consider the following illustrations. The constant repetition of a word will tend to reduce its meaning. It becomes a mere combination of sounds. A pressure, or a group of pressures, which at first is meaningless may take on wide meanings. In this way the blind may learn to read and understand. A simple combination of sounds (a word) may carry different meanings to different individuals. Or the same word may take on new meanings with increased experience. Finally, the meaning of an object (a wild animal) may be gotten by feeling, by smelling, by hearing, or by seeing. Different processes in this case bear the same meaning.

Observer Must Be Trained. The structuralist, as well as others, clearly realizes that the average person cannot differentiate between the meaning given (the object of common sense) and his true sensory experiences. This is not at all strange. From what has been said, it should be evident that sensory processes are quite unlike ordinary experience. And they are, moreover, very difficult to observe. He insists that exact training and a highly specialized and detached attitude are required

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in various attributive ways; but they go on meaningly. . . . Meaning, psychologically, is always context; one mental process is the meaning of another mental process if it is that other's context. And context, in this sense, is simply the mental process which accrues to a given process through the situation in which the organism finds itself. Originally, the situation is physical, external; and, originally, meaning is kinaesthesis; the organism faces the situation by some bodily attitude, and the characteristic sensations which the attitude arouses give meaning to the process which stands at the conscious focus, are psychologically the meaning of that process. For ourselves, the situation may be either external or internal, either physical or mental, either a group of adequate stimuli or a constellation of ideas; image has now supervened upon sensation and meaning can be carried in imaginal terms. For us, therefore, meaning may be mainly a matter of sensations of the special senses or of images, or of kinaesthesis or other organic sensations, as the nature of the situation demands." A little later we learn that, "it takes at least two sensations to make a meaning. If an animal has sensation of light, and nothing more, there is no meaning in consciousness. If the sensation of light is accompanied by a strain, it becomes forthwith a perception of light, with meaning; it is now 'that bright something'; and it owes 'that something' to its strain context" (*28*, 367).

for such observations.[1] It is this training, primarily, which transforms "the man in the street" into an accurate psychologist. One has really to learn (perhaps, it is better to say—to relearn) in order to observe existentially or process-wise.

Now this raises an interesting point. If the structuralist is so highly trained in this particular manner along a very specific line of psychological observation, can we not say that the end products of his observations are, of necessity, somewhat distorted by the very fact of his training? One might be led easily to believe this possible. It is definitely assumed, however, by the structuralist that true sensory facts—various aspects of sensation, for example—are real and are given immediately in observation in exactly the same manner that the chemist or the biologist sees his materials. The only requirements are training and a critical searching attitude. Working under these, one finds *nothing* but mental qualities given in observation; that is, one experiences *only* mental processes.

Physical and Physiological Conditions of Experience. The structuralist takes the theoretical position that the various attributive characteristics of sensory processes are directly related at all times to definite properties of the stimulus. For him, the stimulus is some form of physical or chemical energy. By activating receptor organs, the stimulus sets up a neural impulse which in turn *produces* some sensory process. An adequate degree of change in the conditions of physical stimulation is reflected in consciousness by some attributive change in sensory process, either of the qualitative or the quantitative sort. A change in vibration rate of the stimulus, for instance, brings a qualitative change in the pitch of some tonal sensation. A certain degree of change in the amplitude of the physical wave train in turn produces a quantitative change in intensity. But the determination of sensory quality does not rest solely with the physical, or the chemical agents, which serve as stimuli. Physiological conditions, particularly the peripheral nerve endings, contribute materially to this end. A shift in operation of the microscopic sense cells brings a resultant change in the composition of mind, either by way of addition or subtraction of mental process or property of mental process. Thus the mental *parallels* the physical and the physiological conditions. In other words, the

[1] "The training of an introspective psychologist seems to be no less exacting than the training of an observer in natural history. Neither is born ready-made; both require a certain amount of practice. Both observe better the more complete their information is about what they are to observe. Even though his material is supposed to be given him directly, a beginner's observations in psychology are as useless as in histology." (Dodge, R., *Amer. J. of Psychol.*, 1912; *23*, 222.)

mental processes run a dual course with the physical agent serving as stimulus, and with the neural impulse acting as a physiological basis.

The task of the psychologist from this point of view calls for a determination of the physical and the physiological conditions of each of the qualitative and quantitative properties of mental process. The correspondence which he develops is assumed, within limits, to be invariable. A certain degree of inertia may characterize, it is true, the functioning of the receptor organs and the nerve pathways; but, on the whole, it is definitely assumed, that any change in the peripheral conditions is reflected in consciousness. The end-organs function differently; therefore, there is a difference in mental process. A brief consideration by the student of a few of the explanatory theories of sensory processes will make clear the very decided emphasis laid upon peripheral physiological conditions by this school.[1] The central nervous system appears to play a fairly minor rôle, at least so far as sensation is concerned.

Images and Feelings. When we come, however, to the problem of the neural conditions of the second large class of simple mental elements, the images, we find that the physiological emphasis has now shifted from the periphery of the body to the central regions. It is now the brain with its highly developed cerebrum and cortex that occupies the stage, and commands the attention of the theorist. What was formerly sensation now becomes *image* by virtue of lasting changes in the central areas.[2] The assumed strict correspondence between mental process on the one hand and *physical* stimulation on the other is completely gone; and since very little is known of the nature of the cortical functions the further *correspondence between conscious process and*

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[1] "The task of the psychologist includes . . . the correlation of mental and neural processes; but this correlation implies no casual connection; the two kinds of processes are, it will be recalled, merely logically related. It happens, however, that the present status of psychology is more advanced than that of sense physiology. Consequently, the correlations of psychology have thus far been almost entirely physiological theories. The theory of vision, for example, relates solely to hypothetical processes which occur in the retina and the brain. These theories have proved helpful in suggesting experimental work of purely psychological nature, and they are also useful in holding together the psychological facts themselves. It is probable, however, that when existential psychology has gained a higher stage of development, correlation will cease to be a problem for systematic psychology, although it will still have a place in the logic of experimentation" (*42*, 65).

[2] "Besides the qualities of sensation . . . the psychologist also discovers qualities which are not dependent upon stimulus. The tone may, on occasion, 'sing' with the ear stopped and the red may appear with eyes closed. Whole sonatas and entire panoramas may be presented on the basis of something which wears the aspect of 'echoes' of sensation" (*3*, 47).

nervous system breaks down. When we pass on to the *feelings* we find that a knowledge of the extra-organic conditions is of extremely little aid to our understanding of mental process. The physiological conditions, too, are unknown. Here we find ambitious attempts to relate feelings, for example, to incompletely developed receptor organs for sensation (Titchener), to general metabolic states of the organism (Bentley), or to states of neural readiness or unreadiness to conduct (Thorndike). Finally, we see that if the "correspondence" between mental processes of image and feeling and their physiological bases breaks down, the situation is indeed much worse when we approach the problem of the various fusions or combinations of mental processes. Here we know much about psychology, but extremely little about neurology.

Mechanistic Interpretation. From the preceding discussion it should be quite evident that structuralism, just as we shall later find to be true of behaviorism, is purely mechanistic in interpretation.[1] That is to say, it is mechanistic in the sense that the composition of our mental life is *wholly* dependent upon certain previous events of a strictly *physical* nature, and mind reveals no other properties than those shown in its composition. Since it is here assumed that the occurrence of one physical event rests strictly and immediately upon the existence of another previous physical event, we have a closed sequence which runs from a purely physical agent through physiological or neural change into mental process. We point out this position of the structuralist because we so commonly find students wrongly gaining the impression that just as soon as mind is admitted into a discussion of everyday activities, something anti-mechanistic must of necessity come in. It should be clearly realized, however, that from the point of view of the structural psychologist, the mental is as fully determined by the nature of the preceding events as is any event of the purely physical order. This does not mean, at all, that every psychologist who uses the term mind holds to this position. The mental functionalist, for example, believes quite differently, as we shall now try to show.

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[1] "Structural psychology and behaviorism have the tremendous bond of accepting the world of physical science as a closed system. Structural psychology in addition to the world of physical science accepts a parallel or epi-phenomenal world of consciousness; but behavioristic metaphysics rejects this conscious concomitant. But both behaviorism and structural psychology refuse to allow the interference of nonphysical causes in the physical system. . . . The structural psychologist feels then more at home in the behavioristic world of physico-chemically determined behavior than he does in a world where movements are causally determined . . . by active selves" (*33*, 89f).

Functional Psychology

A casual examination of this system of mental functions clearly reveals to the student the deep influence which the biological sciences have exercised upon psychological ways of thought and interpretation. The position of the mental functionalist is admirably expressed in the following statement from Cameron, an outstanding member of this school:

> Psychology, like biology, may adopt as its fundamental conception for the understanding of man the view that man, like all other living organisms, is subject to a constantly recurring series of changes due to the necessity of adaptation to environment. All animals, including man, are provided with structures and functions that make it possible for them to lead a more or less independent existence. If the environment is not suitable to their needs, they may react in some cases by moving away from the unfavorable surroundings; or in other cases by rearranging or refashioning the environment as, for example, when man builds dwellings (*5*, 6).

Psychology from this point of view is a study of mental life; but, if we may safely draw analogies, it is not so much anatomical as it is physiological or ecological in temper. For this school is not significantly concerned with problems of mental structure, or of atomic composition of mind as revealed through inspective analysis. Its chief interests appear to lie rather with matters of *mental operation* and with mental adjustment to the environment.[1]

Mind an Active Agent. A primary distinction between this functional system and structuralism may be drawn in terms of the conceived rôle, or purpose, of the mind or of consciousness. In structuralism, as we saw, mind does not act. It is at all times a structure composed of many analytically separable elementary parts—like so many bricks in a building—bound together mainly under the chance play of the physical and chemical agents upon sensitive receptive cells. But under the notion of mind or consciousness as function, we come upon a wholly different way of regarding mind. It is now a dynamic, forceful agent.

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[1] "It is always advantageous, in my opinion, when one wishes to study a psychological phenomenon, to begin the approach from the functional angle; in other words, before trying to analyze it in detail under a strong magnifying glass, as it were, to examine it rather less enlarged, in order to take account of its functional value, its general part in conduct. . . . The functional point of view places the emphasis on conduct. Functional psychology demands less what the phenomena are, than what they *do*. It is thus closely related to behaviorism. It is clearly distinguished from it, however, since that which interests it is conduct, its laws, its determinism, and not the method by which one pursues the study of these laws" (*8*, 125).

It is intensely active. It works. And in its work it is intimately related to or bound up with, the action system of the individual—the nervous system and the muscles—and through them it produces profound changes in the world. Consciousness from this point of view becomes a biological tool for the maintenance of life. It is a product of organic evolution and in turn contributes materially to the course of evolution by aiding in the struggle for existence.

> Consciousness is no less a fact than the inner standard temperature of the body. In both cases evolution has prepared an inner set of conditions in which life is more advantageously promoted. In the case of consciousness, however, the evolutionary process has gone so far as to produce a function which changes the whole balance of the world and puts the environment in a very real sense of the word under the control of the inner organized being (*13*, 80).

It is an organic device serving to provide the individual with a more efficient means of adjustment to its environment.[1]

Mind an Adaptive Device. On the whole, mind reduces, according to this way of thinking, to an adaptive mechanism supplementing the racially more ancient and less efficient unconscious devices for organic adjustment; *viz.*, the reflexes and the instincts.

> The significance of the part played by consciousness may be understood by considering those cases of adaptive reactions that take place unconsciously. The typical cases of such reactions are the reflexes. Take, for example, the well-known pupillary reflex—the narrowing and widening of the pupil of the eye in response to changes in the amount of light. Here is a mechanism clearly adaptive in function which operates under proper environmental conditions independently of consciousness. One of the main characteristics of pure reflex action is its invariableness. Given the proper stimulus, the reaction follows inevitably and in the same manner each time it occurs.
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> Animals low in the scale of living forms exhibit a type of behavior that is almost purely reflex. Their life conditions are relatively simple and unchanging and there is little demand for change in the activities which they are equipped to make as soon as they come into existence. It is conceivable that the higher forms of life might have been constructed on the same plan, with a purely reflex response to adapt them to every condition that the changing and complex environment would present; but such a plan would require a piling up of reflex mechanisms to such a degree as to make the nervous sys-

[1] According to Angell, we are to regard "all the operations of consciousness—all our sensations, all our emotions, and all our acts of will—as so many expressions of organic adaptations to our environments. . . . Mind seems to involve the master devices through which these adaptive operations of organic life may be made most perfect" (*1*, 7).

tems so intricate and complex that this method of adaptation is scarcely more than conceivable. Obviously, the more varied and complex the environmental conditions to which the animal must respond, and the more necessary it is to respond to changing conditions, the less suited is the invariable type of response.

Intimately associated with the adaptive functions already mentioned is the function of consciousness, which appears as one of the links in the chain leading from impression to reaction. At just what point in the development of the animal series from lower to higher forms this function of consciousness makes its appearance it is difficult to say, but in ourselves we have come to recognize it as the most significant aspect of our existence. It is true that certain adaptive reactions may take place, as in the case of reflex and automatic actions, by means of the mechanism already described—the sense organs, nervous system, and muscles—without the presence of consciousness. But in the case of the large majority of actions during waking life the conscious processes are present and play a unique part among the various factors leading to action. Conscious adaptations, however, are so complex, the muscular processes that are related to them are so frequently delayed or overlooked, that our thoughts and feelings seem to have an importance as existences in themselves, apart from the rôle they play in relation to action. Whatever may be the truth as to the ultimate nature of mind is a problem that must be left to philosophy to settle. For present purposes, consciousness must be regarded as a function of living organisms, whose purpose is to enable its possessor to adapt his behavior to environmental conditions on a higher plane and in a more effective manner than would be possible without it. Non-conscious behavior is fixed because it is predetermined by heredity, but conscious behavior is fluid and changing, adapting itself to conditions as they arise (*5*, 8).

Mind Aids in Survival. We discover, then, that consciousness appears either racially or individually when the group or the organism is confronted with conditions so unusual that the ordinary modes of response are inadequate. The stress which the functionalist places upon the rôle of mind in adaptation is clearly brought out in the following statement. Referring to a functional theory of emotions, Howard says:

The organism must be able to adapt itself to the changing circumstances of its environment if it is to preserve its integrity of life and action. We find accordingly, that organisms, which survive and prosper and secure for themselves the fullest range of action and mastery are quick and discriminating in their adaptive reactions, resourceful in the face of difficulties. So much is elementary. But the theory has still another implication which is too often neglected. A distinction is to be made between two types of adaptive reaction. There is a form of organic adaptation—brought to its highest per-

fection in the social bees and ants—which is reflex, routine, automatic, or predetermined by habit patterns in the nervous system. There is another kind of adaptive reaction that is plastic, built up to meet the peculiar requirements of novel situations, essentially creative and spontaneous. No psychologist may call himself a functionalist who has not grasped the reality and the significance of the latter form of adaptive reaction. . . . When the individual confronts a situation to which he is not habituated, to which no pre-organized response is forthcoming, the internal conflict or disequilibrium that results immediately arouses a secondary, indirect process by which the stimulus is reconstituted, the disorganization overcome, and response prepared that is suited to the occasion. Such secondary, reconstitutive activities are what we know in humans as mental, conscious, or attentive processes; they are non-habitual, creative, emergent. In calling these processes secondary, I mean that they involve the preparation and guidance of reactions, and do not themselves involve direct responses to stimuli. Perhaps, also, the statement that they occur upon occasion of the failure of automatic and habitual responses may mislead some into supposing a real disjunction between the secondary and primary activities of the organism. It is probable, on the contrary, that the secondary processes are constantly operative, in waking life, to maintain the organism's equilibrium of action. For the secondary or conscious processes are just the equilibrium-maintaining activity of the organism itself (*11*, 141).

During the course of development we should naturally expect that the organism would face, from time to time, entirely novel situations. If its innate equipment of stereotyped responses then prove inadequate to cope successfully with them, consciousness appears and controls the activity until habit forms, after which consciousness may again lapse or decline. In perception, for instance, the conscious scrutinizing by the organism of the environmental situation permits of a more adequate means of adjusting itself whenever the actual need may arise. Under this way of thinking the ordinary experiences of perception, memory, emotion, affections, imagination become so many functional resources for racial or individual maintenance.[1] Thus they

[1] In making clear the significance of the affective processes as adaptive devices, Claparede writes that "The function of affective phenomena is a function of regulation. This regulation consists in the attitudes which the organism takes with respect to the stimuli (internal or external) which reach it. But we can ask: Since these attitudes are of instinctive nature, why are they conscious? Why do they not all take place in a purely automatic fashion? Why this mentalization of affective phenomena? Of course, we can readily imagine an automatic regulation and a purely objective valuation of stimuli; we establish this in a large number of organic processes of assimilation, nutrition, secretion, digestion, etc., where substances are selected, rejected, received—all this in a purely instinctive and unconscious manner. But the point in question here concerns those functions which are accomplished in a uniform manner. Mentalization has evidently for its *function the enabling of the individual to cope with new circumstances*" (*8*, 139).

are not of so much importance in and of themselves. They are primarily of interest because of the degree of survival value which they possess. Here, we should point out, appears one of the weaknesses of the school. We saw that the structuralist seems slightly unbalanced by his pronounced emphasis upon the analysis of mind. In the same way, the functionalist is definitely inclined toward another extreme in his strong insistence upon the way in which the mind is used in producing desired organic adjustments to the environment.

The Concept of Adjustment. The problem of adjustment is a very interesting and at the same time quite a troublesome one. If an individual is not adjusted he supposedly moves about seeking adjustment. When he is adjusted he comes to rest. Theoretically speaking, if an individual were to be completely or perfectly adjusted to his "environment" (we used the term advisedly) he should be entirely quiescent. Moreover, it would readily appear that under complete organic adjustment all consciousness should disappear. For, if the rôle of mind is to maintain the organism in harmony with its physical environment, like any good servant it should quietly retire when its task is completed, but remain on the alert so as to reappear when needed. It can be seen, too, that considered from the standpoint of adjustment, mind must of necessity have fairly definite ends or purposes of attainment.[1] One cannot simply adjust. One must adjust to something. And it is surely not enough to call it environment and rest satisfied. There must, of course, be some goal or end in terms of which these adjustments are made. To the degree to which these ends are met or these purposes fulfilled, mind may be said to be efficient. The difficulty arises, however, in ascertaining the nature of these ends. Put in other words, what is the character of the particular environment, or part of environment, to which the individual is supposed to make his adjustments? It is quite easy to see that we may take organic survival—racial or individual—as the crucial test and so say of a particular individual or group that, because it failed to survive it was not properly adjusted or adapted to its environment. But what can we say of that individual

[1] "The importance of consciousness in the evolutionary processes is that it solves the age-long opposition of individual and environment in a new way, giving to both a unique recognition and to the individual a supremacy over external conditions which none of his other functions ever permitted. Contrast consciousness with the nutritive function. Through digestion much material is taken into the organism and is used to build up animal tissue, but there is no reflex influence on the outer world. The environment is not made, through the process of digestion, more digestible for the future. When, however, we discover through consciousness how to use the world for the ends of individual life, the environment itself can be modified so that it will from that time on be different in its relation to the evolved individual" (*13*, 84).

or group which deliberately faces extermination in carrying on what it believes to be its duty or its appointed end in life? Shall we say, by way of illustration, of the great reformers—those who have stood out in the vanguard of change—that they were improperly adjusted? That, in fact, they were seriously in need of better adjustment? Can we say, for example, of the Christian martyrs, that they were decidedly maladjusted, and that they really should have done as the other Romans? Or that they should have adapted themselves better to their environment? If they had done so, they would, no doubt, have survived. Surely, then, they could not have been well adapted to their environment.

On every hand we have this concept of adjustment continually dangled before our eyes. This person, we are told, is badly adjusted; or this one is now going through the process of readjustment. The white man, after a time, adjusts himself to the rigorous conditions of arctic regions; the English sparrow, to an "American" habitat. We hear it said, "Now that he is adjusted, he does better work"; or, "He does better work; he must be adjusted." In every case, we find that the test of adjustment is that something is done. Some end is achieved—more happiness, greater efficiency, or survival. We learn that intelligence makes clearly for more adequate adjustment. The greater the degree of intelligence of an individual or a group of individuals the larger the capacity for adjustment. With the next breath we are told that the members of a particular species of animal life, because of instinctive nature, appear to be better adjusted to their own than to the environment of another species. What is apparently meant is that a certain group of individuals survives under the one set of conditions and another group survives under another set of conditions. As long as a group multiplies or continues to maintain itself in a given habitat, we can properly say that it is as well adjusted or adapted as any other group. If a change occurs in the environment and a group fails to survive, we can say that it was not very intelligent or that it instinctively failed to adjust itself. If it survives under almost any sort of environmental change, then we can say that it is quite intelligent or that it instinctively adapts itself in the proper manner. Either intelligence or instinct may do the task with equal efficiency. The end is the same.

From what has been said, it would perhaps appear that until we know the particular environment of an individual we can scarcely speak of his adjustments. We must be acquainted with the actual end to which adjustments are to be made, before we can speak of, or properly judge, adjustive behavior. Clearly, some individuals do not adjust

to an environment as *I* know it. But, of course, my environment is quite probably never like that of another—regardless of all protests to the contrary. The effective environment of any individual, human or animal, is partly a product of the individual's needs, purposes or drives and partly a matter of the physical conditions at the moment surrounding the individual. If we take behavior at the descriptive level, we find that an animal that has eaten to repletion passes food by as if it were not there, in the same way that a deeply engrossed or absent-minded person may pass objects which at other times would command observation. At the moment, in either case, they do not exist for the individual. We must realize that this creation of the environment is peculiarly true in case of the human individual. We can not speak easily of adjustments of an individual to its environment until we actually come into possession of more knowledge than our careful examination of the physical environs of an individual reveals.

An individual may believe that he is adjusting himself beautifully to his own particular environment, although to some outsider it unquestionably appears that he is exhibiting the highest degree of maladjustment. This seems especially true of the usually misunderstood and misinterpreted activities of the great leaders and reformers. Their environment is so different from that of the average individual that it is almost absurd to raise the matter of adjustment. It has been said that the great cannot be judged in this sense, because they have created such an unique world for themselves that the ordinary standards utterly fail—the person is bigger than the standards. Or take the extreme case of the so-called queer or insane persons. We say that they are silly or crazy, because their behavior patterns fail to conform to our own standard or notion of behavior adjustment. In short, they do not adjust to their environment in a way which we believe they should. Yet an understanding of the psychology of such individuals leads one to believe that such persons may be doing the only proper thing possible under the actual conditions of the world as they experience it.

The whole problem is very complex. It is neither the place nor our task here to settle it. It should be clear, however, that the term adjustment is a strictly biological concept in which the real and final test is one of organic survival—a matter of life and death. As such, one may seriously question whether it can be made to do proper service in the field of psychological thinking. Where the test cannot be one of life and death, and where the more significant features of the environment rest upon or are determined by intra-organic conditions, it seems rather far-fetched to speak of adjustive behavior unless one means

nothing distinctive by the use of the term. An individual who stresses the concept of adjustment should recognize the true biological connotation of the term and the possible limitations of its application to psychological activities. Clear thinking always demands more than the mere use of words. The attempt to force the descriptive terms of biology upon psychology has resulted, in this connection, in a considerable degree of confusion and loose speaking. Furthermore, to extend the concept of adjustment so as to make it include as a blanket term all the behavior of the organism, is simply to destroy outright the usefulness of the term without adding in any manner to our understanding of human behavior.

A Behavioristic View of Adjustment. Of all individuals, the behaviorist of the extreme sort has been especially guilty here. Watson, for instance, tells us that it should be "understood that whatever a man does under stimulation is a response or adjustment—blushing, increased heartbeat, change in the respiration, etc., are definite part adjustments. We have names for only a few thousand of the total possible number of such adjustments. The term adjustment is used by most writers to refer to the doing of one of these named acts. In this volume, the term adjustment, response, and reaction are used almost interchangeably" (*34*, 12). But this surely results in completely robbing the term of any distinctive value which it might otherwise possess. Since every bit of behavior is adjustive, no distinction is raised by the use of the term. It is possible, of course, that the psychologist, particularly the behaviorist, does not mean that the term is to be distinctive. But the critical biologist does not employ the term to mean anything done by the organism. For him it is a particular type of behavior. It is regrettable that the psychologist should borrow a perfectly good term from a sister science and then so corrupt it that it becomes almost meaningless.

BEHAVIORISTIC PSYCHOLOGY

Introduction. All science and all systems of psychology represent abstractions. In the two schools of consciousness which we have just discussed, the mental side of the organism is mainly stressed. While the bodily happenings, in many cases, may be considered, they do not command, in any way, the same degree of interest that is given the mental. In the structural system, the bodily processes are assumed to run their courses as the physiological basis of the mental; in the functional system the mind employs directly the receptor organs, the nervous system and the effector mechanisms as effective tools in adjustment.

In neither, is the body the direct object of examination or study. We must now consider another attempt to understand the human organism in which the abstraction has taken an opposite direction to that of the above two. Here the mental side has been partially, or in some cases, wholly disregarded, while a major degree of emphasis is placed, instead, upon the purely bodily side of the organism. This system is known as behaviorism.

What Is Behaviorism? We wish that we were able for the purpose of clear discussion to give a straightforward and clean-cut definition of behaviorism. But it is not possible. There are many "shades" of behaviorism; as many as, if not more than, are found among the schools of consciousness. In considering the nature of behaviorism, Prince agrees that it is not possible "to define Behaviorism or Behaviorists in terms to which all who claim to be good and true believers" would hold. But he points out that it is "reasonably accurate to say that Behaviorism is an attempt to explain human (and of course animal) needs, motives, desires, impulses, emotions, thought—in short conscious activity—and the resulting bodily activity in terms, not of consciousness, but of the neural and glandular processes correlated with the former and of the bodily motor behavior which they admittedly induce. Accordingly, it is not necessary to take account of consciousness at all, but only of the objective processes which are correlated with consciousness, and which enter into the chain of causal events eventuating in bodily behavior. Whether or not consciousness has anything to do with determining our actions, behavior, conduct, bodily reactions can be adequately explained by the mechanisms of the nervous system considered as reflex processes organized into systems (patterns) and the resulting motor activities of the individual" (*24*, 199). Certain behaviorists go so far as to maintain that consciousness, as thought of in the two previously discussed schools, has nothing whatsoever to do with our bodily reactions and with our conduct. We must now scrutinize the nature of a system which proposes to deal psychologically with the human being without reference to anything of the mental order.

Some of the keenest discussions of the nature of behaviorism, its methods, its problems and its inadequacies have come from Lashley, a dominant figure in this school. We believe that the following statement from him should materially contribute to an understanding of this field.

> Behaviorism has broken most completely from the traditions of the older psychology, which is willing to leave the problems of everyday life to the "applied sciences" of sociology, education and psychiatry. The behaviorist

holds that the greater part of introspective psychology is only a poorly devised physiology of the sense organs, and that its minor importance as such should be generally recognized. He would make of psychology a true science of human conduct.

By what means? From physiology we inherit reflexes, conditioned reflexes, and glands; from animal psychology habit, trial and error and instinct; from psychiatry, emotional complexes and conflicts; from subjective psychology, a horrible example. With this meager equipment we must begin our task. The task is first to define more clearly the problems of reaction, of motivation and integration in behavior, to analyze the behavior components in specific activities; second, to state them in terms of the physiological mechanism involved. Without physiology, behaviorism can make but little progress, for its explanatory principles are physiological and no sharp line can be drawn between the two sciences. For the present if we are to deal with complex human activities, we must be content with a pseudo-explanation offered by such conceptions as "set," "habit," "gestural reaction," "drive," "conflict," "dominant stimulus," and the like. . . . At present behaviorism is based largely upon the conceptions of subjective psychology. Its categories of structural psychology and its "explanations" are largely rephrasings of "subjective descriptions" (*23*, 348).

Since Watson has been outstandingly active in advancing this form of psychology, it is perhaps proper to inquire at this point concerning his position and point of view. We learn accordingly from him that "Behaviorism is a natural science that takes the whole field of human adjustments as its own" (*38*, 11). Its theoretical goal is the prediction and control of the activities of the human being through a study of the child, the animal and the adult by means of the "objective" procedure of the biological sciences. And although the methods of the experimental behaviorist may, in reality, be those commonly employed in the field of physiology, it should be clearly understood, we are told, that behaviorism is not physiology.

Physiology deals with the functions of the special organs. For purposes of experimentation and exposition, the heart, liver, lungs, circulation, respiration and the other organs are isolated, and they are discussed as though they functioned in an isolated way. Muscle-nerve preparations are taken out and their properties investigated; glands and their action are likewise experimented upon. All of the functions of the bodily organs are gone over from this standpoint. It is not meant to assume that physiologists deal wholly with organs in isolation. Certain combined processes are studied, such as metabolism, digestion, effects of poison, etc., but nowhere in physiology do we get the organism, as it were, put back together again and tested in relation to its environment as a whole . . . when the physiologist has learned all that

he can about the functioning of the separate organs of the body of man, he has encroached upon our field only in a very slight degree. Our task begins only when the physiologist puts the separate organs together again, and turns the whole (man) over to us. The physiologist *qua* physiologist knows nothing of the total situations in the daily life of an individual that shape his action and conduct. He may teach us all there is to know about the mechanism of stepping, but it is not his task to determine whether man walks before he crawls, the age at which walking begins, whether walking begins earlier in boys than in girls, or whether defective children walk at a later age than normal children. Again, he may teach us a great deal about the functions of the kidneys, the bladder, and of the sphincter control of the latter; but of the special situations (outside of disease entities) which may lead to incontinence in children, his science teaches him nothing, nor of methods of controlling this mal-adjustment (*34*, 19).

The behaviorist is interested, then, in organic activity of an adjustive sort. The psychological organism, human or animal, is assumed to be a very complex organization, or pattern, of chemical and physical elements.[1] Under certain appropriate conditions of physical stimulation, energy changes occur in the level of metabolism of this organism which are immediately reflected in bodily movements and in glandular activity. The first task of the behaviorist is to derive some degree of understanding of the nature of the physical antecedent conditions of these energy changes. The immediate source responsible for these changes is to be found in the stimulus.[2]

What Is a Stimulus? Consider, for a moment, the nature of this very important factor for the behaviorist. "We use the term stimulus in psychology," we are told, "as it is used in physiology" (Watson).

If I flash a strong light in your eye, your pupil will contract rapidly. If I were suddenly to shut off all light in the room, the pupil would begin to widen. If a pistol shot were fired suddenly in the room, you would possibly turn your head around. . . . Just before dinner tonight the muscles of your stomach

[1] For Weiss, the position of the behaviorist may be simply expressed in the statement that "all human conduct and achievement reduce to *nothing but:* (a) different kinds of electron-proton grouping, characterized according to symmetry or geometrical structure; (b) the motions which occur when one structural or dynamic form changes into another" (*41*, 49).

[2] "Since the behaviorist accepts the theories of physics and chemistry as adequate for the explanation of nature, it is said that stimuli should be stated by him in terms of these sciences. This criticism ignores the fact that the behaviorist accepts a common sense view of the environment. . . . The anthroponomist (behaviorist) has no more hesitancy in saying that he gave water to his chicks in order to see whether they would drink than a chemist has in saying that he has completed the analysis of water into H_2O" (*12*, 103).

began to contract and expand rhythmically because of the absence of food. As soon as food was eaten those contractions ceased. In the male the pressure of certain fluids may lead to sex activity. In the case of the female possibly the presence of certain chemical bodies can lead in a similar way to overt sex behavior. Many of our most intimate and personal reactions are due to stimuli set up by tissue changes in our striped muscles and in our viscera (*38*, 12f).

There are still many other forms of stimuli. But here the behaviorist departs from the language of physiological science. For although he uses the term in "psychology as it is used in physiology," the behaviorist is forced, we are informed, "to extend somewhat the usage of the term" (Watson). Watson does not tell us why he is so forced "to extend somewhat the usage of the term." This change in terminology simply remains unexplained. We can no doubt gain a much better understanding of the actual working program of a behaviorist by considering the nature of a few of these extensions in the use of the term stimulus. Take the following illustration. If I am hungry and "I spy apples on a tree I immediately climb the tree and pluck the apples and begin to eat." Here the *apple*, or the *tree*, or both serve as the stimulus. Or, again, "The cold air stimulates me. I move about until I am out of the wind. In the open, I may even dig a hole." Finally, as an illustration, we may have the invitation, "Meet me at the Belmont tomorrow for lunch at one o'clock"[1] (*38*, 14f).

What Is a Response? If the behaviorist were to formulate slogans, his would run somewhat in this vein: "There can be no response without a stimulus." Or, "As the individual is stimulated, so must he act." Life for a behaviorist starts with the stimulus of being born and ends with the response common to all mortals, death. We can neither delay the one, nor prevent the other. The same is true of all other responses. Behaviorism, thus, brooks no delays. The organism either responds now; or it does not respond at all. It is very much like the refrain from a song, which runs, "What you're going to do, do now." While psychologists and psychoanalysts may think, we are told, that the stimulus can be given today and the response will occur tomorrow or later, Watson warns the student against accepting or believing any such myths. The stimulus must issue immediately by way of some bodily response. There

[1] "It seems necessary to add to the assumptions of the behaviorist one more which would permit him to label all these trappings of the universe 'stimulus.' That they may reasonably and sensibly be brought under the category of physical science is usually assumed, not demonstrated, by the behaviorist. The universal applicability of the 'stimulus' label seems to require not logic but only devotion to the behavioristic faith" (*4*, 77).

is this definite parallelism between stimulus on the one hand and response on the other. One applies the stimulus and takes out the response. Apply one sort of stimulus and, of necessity, you must secure a particular sort of response—just as the dropping of a reagent into a pot of chemicals must give rise to a particular reaction. Here we are in sight of the goal of the behaviorist, which he expresses somewhat after the following fashion: "Tell me what the stimulus is and I'll tell you the response," or, "Tell me what the response was, and I'll tell you the stimulus."

Now what does the behaviorist mean by response? Again let us go to the same source as above. "We employ in psychology the physiological term response; but again we must slightly extend its use." Thus we find listed such responses as the simple reflexes of the dilation and contraction of the pupil, the fanning out of the toes in the young baby, the knee jerk, the quick retreat from dangerous objects, the taking of food, the building of houses, becoming engaged, war, prohibition. The actual response in all cases must take the form either of a contraction of striped or smooth muscle fibers or of glandular activities. The striped muscles are responsible for the many forms of movement of the limbs and trunk; the unstriped muscles for control over the internal organs, or, rather, the viscera.[1] In case it is glandular activity, some secretion either of duct or ductless glands is produced, such as bile or adrenin; or the liberation of glycogen may take place.

Classes of Responses. All the diversified activities of the human being as found in his daily life appear to fall into certain large divisions or groups. The following is an attempt to classify the various forms of behavior under their appropriate heads. Most reactions, we are told, may be looked upon as falling into one of four main classes:

1. Explicit habit responses: as examples, we cite unlocking a door, tennis playing, violin playing, building houses, talking easily to people, staying on good terms with the members of your own and the opposite sex.

2. Implicit habit responses: thinking, by which we mean subvocal talking, general body language habits, bodily sets or attitudes which are not easily

[1] The viscera play a vitally important rôle in behavior. It might be well to realize just what is included under this large head. Again we find some departure from the accepted classification of physiology. "Let us extend," Watson says, "the meaning of the viscera to include the *mouth*, the *pharynx*, the *oesophagus*, the *stomach*, the *small intestines*, the *large intestines*, the *heart*, the *lungs*, the *diaphragm*, the *arteries* and *veins*, the *bladder*, the *urinary* and *anal passages;* the *sex organs;* the *liver*, *spleen*, *pancreas*, *kidneys* and all the other *glands* of the body. This is not a strictly scientific classification, but we are in need of a term in psychology which will include all our inside organs" (*38*, 57). The term viscera is used then in this rather unusual sense. At another place, the pupillary reflex is put down as a gut (visceral) response.

observable without instrumentation or experimental aid; the system of conditioned reflexes in the various glands and unstriped muscular mechanisms—for example, conditioned salivary reflexes.

3. Explicit hereditary responses: including man's observable instinctive and emotional reactions as seen, for example, in grasping, sneezing, blinking and dodging, and in fear, rage, love.

4. Implicit hereditary responses: this includes, of course, the whole system of endocrine or ductless gland secretions, changes in circulation, *etc.*, so largely studied by physiology. Here again instrumentation or experimental aid is necessary before observation can be made (*34*, 14).

Our space is too limited to discuss these classes. They should be fairly understandable with a little reflection upon your own activities in the light of this suggested classification.

The Organism a Machine. The behaviorist (Watson) means that under the above classes of bodily activities, goes every phase of one's psychological life from birth to the bier. They represent at once all the possibilities as well as the limitations of the individual's psychological activities. The individual, we see, is a machine (an organic, elongated, tubular machine) which set into operation by virtue of the protoplasmic property of irritability and by a stimulus, pulsates, jerks, quivers and secretes by virtue of the further protoplasmic properties of conductivity and contractility.[1] The physical and chemical agents of the environment play in chance order about, over, and upon the sensitive mass of organic material. Under their influence now this and now that receptor organ, each biologically tuned through natural selection and survival, is momentarily thrown into functional activity. The energy of the physical and chemical stimulus is transformed at the surface of the body (or the place of sensory activity) into a new form—neural energy. This is drained away "down hill"—from the place of greatest activity along the path of least resistance—to some set of effectors which momentarily twitch, perhaps twitch again, and then subside into inactivity. Or, energy liberated in some gland changes its form, thus resulting in the throwing off of a few drops of material which immediately, so far as the gland is concerned, becomes purely waste matter. In the meantime, some Alexander has determined upon the conquest of a new world, a Newton has formulated a law of falling bodies or an Edison has thought out a way to make rubber. Thus the story runs.

[1] "All of man's achievements are merely the totality of his behavior, and all behavior it is assumed, may ultimately be reduced to the functioning of the contractile elements within the body" (*41*, 169).

It should be clearly recognized that whether the behaviorist is discussing the total excursion of the leg in the knee jerk, or the experience of ineffable grandeur as the world spreads out before the gaze of the watcher on some high mountain peak at dawn; the unconscious dilation of the pupil of the eye under a decrease in the intensity of the illumination, or the shocking sight of a fellow man calmly leaving his companions at their camp fire and walking out upon the limitless ice fields of the antarctic barrens to die, in order that his comrades, thus freed, might push on to safety—the description is always the same. And it is on the whole fairly simple. There is, to be exact, the physical situation which serves as the stimulus and there are the activities of the bodily members: the sudden contraction of some muscle, or set of muscles; or the momentary functioning of bits of glandular material.

Behaviorism Is Materialistic and Mechanistic. Behaviorism is thus frankly materialistic in point of view and mechanistic in interpretation (description). It is a modern expression of the much older doctrine of materialism—a doctrine that started with the early Greeks, appeared in the writings of Descartes and was very clearly and ably expounded by Herbert Spencer and by such biologists as Loeb, Bechterew and Pavlov. The earlier contentions of Spencer, that all human behavior is adequately describable (explicable) in terms of chain reflexes, are the property of everyone. Behaviorism with its emphasis upon simple physiological reflexes represents a straightforward attempt to apply this doctrine to the psychological activities of organisms; to reduce such activities to terms of physics and chemistry of the body.[1] It is an attempt to extend the physical concepts of matter and energy so as to include the psychological activities. The behaviorist proceeds under the attitude that all of the processes in the world are essentially of one sort, and that these processes are of the kind which are assumed by the inorganic sciences in their endeavor to understand the physical universe.

Muscles and Glands. It makes man, we might say, a two-sided automaton.[2] On the one side there are the conditions of stimulation—

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[1] But it seems that behaviorists have been handicapped to a considerable degree in their attempts in this direction, largely because of the regrettable lack of factual evidence to support their position. According to Prince, a very fundamental error of behaviorism is to suppose "that behavior can be today completely explained in terms of the correlated neural and other bodily processes alone." There is not nearly enough knowledge of bodily functions to give weight to their contentions (*24*, 204).

[2] A clever bit of chiding is to be found in the following quotation. "I should like to hear a behaviorist arguing his case before a judge and making the plea that he was only an automaton and his 'criminal intent' had nothing to do with his criminal act; that it was his neurons or his ductless glands or his conditioned reflexes which

the fortuitous bombardment of the organism by physical and chemical energy; on the other side, the response. The organism has been reduced in this way, so to speak, to a front and a back, with nothing, perhaps, of very much importance sandwiched in between. There is the "front" door—receptor organs—through which energy is "admitted"; and there are the two "back" doors—muscles and glands—through which the energy again "spills out" upon the world. With the behaviorists of the extreme type, the central nervous system lacks sufficient importance to merit consideration in a behavioristic discussion.[1] Thus we find in a recent book by Watson (*38*), diagrams given of the structure of glands and muscles; of afferent (sensory) and efferent (motor) neurones; of the alimentary canal and the stomach. But, interesting to say, no accompanying diagrams are given of the central nervous system—the cerebrum with its functional areas, the cerebellum and the cord. The central nervous system is not significant. It neither initiates nor produces changes in the responses; only the appendages—the sense-organs and the effectors are important. The activity path is from receptor organ to muscle or gland. And it seems expedient to shorten the pathway as much as possible by dropping out those intermediate structures which might, if considered, tend somewhat to complicate it. Simplification, it would seem, becomes the goal of such accounts. And if we may believe certain critics, simplification is perhaps obtained at the expense of completeness of understanding and scientific thoroughness.

The problem of the significance of the central nervous system as a determining factor in psychological behavior may be solved quite simply by ignoring it. It is a less troublesome way out; for it would appear that in so many cases so little is known about this one link in the whole causal chain of events that a satisfactory behavioristic account of the antecedents of any given response is impossible. According to Köhler,

"Between the two terms of a sensory-motor circuit there is more *terra incognita* than was on the map of Africa sixty years ago" (*14*, 52). And if we may believe Prince, "We know almost nothing about brain processes, nothing of their nature, and cannot possibly even guess at the concrete brain process that is correlated with any particular mental process; and as we cannot therefore follow a stimulus through its intricate and complex reflex course of com-

did the crime; I would love to hear the judge say, 'Yes, quite so; five years in jail. Next case' " (*24*, 203).

We accept this definition of an automaton: that which is self-moving or has the power of spontaneous movement but is not conscious. Person or animal whose actions are purely involuntary; person who acts without intelligence. (Century Dictionary).

[1] This is not true for many behaviorists.

plex brain processes until it emerges in motor and other pathways as behavior —in view of all this ignorance, we are perforce compelled to explain the causal antecedents of behavior in terms of mind, of will and purpose and not reflexes" (*24*, 220).

Lashley, too, clearly recognizes this lack of concrete knowledge of bodily functions. He remarks that "the behaviorist's chief handicap is the lack of an adequate physiology upon which to base his science. The exaggerated emphasis upon conditioned reflexes, suprarenal glands, 'sets' shows the paucity of the material at hand" (*23*, 351).

The Task of the Behaviorist. The behaviorist of the *extreme* type, as we have seen, takes as his major experimental task that of applying the methods of structural analysis to human and animal conduct. He seeks to break up the complex behavior patterns of the individual's daily life into their anatomical and physiological elements. He takes, for example, what some would call a highly integrated action pattern and tries to resolve it into its constituent bodily parts. These elements are, in the large, the simple reflex arcs with their appendages. They are his elements in the same way that the structuralist speaks of simple, mental items. And just as we saw that the descriptive account of the structural psychologist was quite inadequate to the facts of the integrity of experience, so we can likewise see that the descriptive accounts of the behaviorist couched wholly in terms of limb mechanics or in terms of physiology of muscles or glands, are similarly inadequate. His careful descriptions may unquestionably add to the sum-total of our knowledge either of bodily operations or of certain phases of particular organ activity. But, if we wish to hold to the facts of observation, either experimental or non-experimental, we cannot truthfully say that the most complete description possible to formulate of leg movements or oozing glands gives an intelligible account of the behavior of a hungry human being seeking food. It simply means that physical and chemical descriptions are not adequate for an understanding of our many and ordinary forms of psychological behavior.

Inadequacy of Descriptions. This descriptive inadequacy has been recognized, as we should naturally expect, by some outstanding behaviorists. Consequently, they have been quite unable to go to the lengths to which Watson, for instance, has gone. They well realize that an atomistic description in terms of simple bodily elements, either structural or functional, must of necessity leave out of account the very thing for which the psychologist is presumably striving; *viz.*, an understanding of what the whole organism, at any one time, is actually doing—not an account of independent items which put together give nothing in-

tegrative or dynamic. Tolman, for example, has sought to make clear his opposition, as a behaviorist, to any form of what he calls a "muscle twitching" behaviorism. He finds it imperative to put his behavioristic descriptions in terms of what the organism does as a whole. Take, as an example, the activity of the human or animal organism seeking food. Here, for Tolman, is a goal—the food—which operates continuously to motivate the organism until satisfaction through eating occurs. The animal, ever restless, ever moving, goes here and there until food is reached and consumed. Activity then ceases and behavior of the food-seeking sort is no longer observed. The descriptions of such behavior are not to be put in terms of independent bodily units. They are to be stated, rather in terms of what the human or animal organism does in the light of some purpose or end which is significant to the individual.[1]

Tolman *vs.* Watson. Tolman[2] takes Watson seriously to task for his decided emphasis, in his descriptions of behavior, upon the physiological reflexes and glandular activities. Quoting from Watson, he writes, " 'It is possible for a student of human behavior entirely ignorant of the sympathetic nervous system and of the glands and smooth muscles or even of the central nervous system as a whole, to write a thoroughly comprehensive and accurate study of the emotions.' " He then continues, commenting critically upon this statement:

> But how can this be, we ask, if, by very definition, behaviorism is a matter of "muscle contractions" and "gland secretions"? How, on the basis of this definition, can a person "ignorant of glands and muscles" write a behavioristic account of anything? That he can write such an account we would admit. The only difference between our point of view and Watson's would be that we should insist that such an account would be the only truly *behavior* account, and that an account in terms of muscle contraction and gland secretion, as such, would not be behaviorism, at all, but a mere physiology.

Here it does appear, is a behavioristic program that is in touch with actual life. It is not the highly abstract form found in some other quarters. It is the type of behaviorism represented by Tolman and others that must lead eventually, it seems, to a clearer understanding of human and animal behavior problems. It is the sort that does not

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[1] To make sure that Tolman is not misunderstood as to what is meant by such terms as goal seeking, purpose or end, we cite his own statement as to the use of such words. "It appears that goal seeking must be defined not only as a tendency to persist in a more or less random fashion until food is reached but also as a tendency to select within limits the shorter (and probably also the easier and pleasanter) of two or more alternative ways" (*32*, 287).

[2] Tolman, E. C., "A New Formula for Behaviorism," *Psychol. Rev.*, 1922, *29*, 45.

leave one grasping only the dry analytical "bones" of the activities of a living, vital creature.

The Results of Analysis. The process of extreme behavioristic analysis reveals a few simple innate reflexes and tendencies. While Watson, for example, denies the existence of instincts, it would appear that he really accepts essentially the same sort of racial contribution to behavior when he includes among his classes of innate behavior patterns, certain action tendencies. Thus the child is found to be innately afraid under a few situations; it is innately angry under other situations; and it is innately pleased under still other environmental conditions. Whether we start with simple reflexes or simple innate tendencies, we have the possibility of a wide extension under training by way of the so-called conditioned reflex. The extension may occur on the side of the stimulus conditions so that many new stimuli (gross environmental situations) now evoke the response innately characteristic of one single stimulus. In other words, the organism during the course of its development faces new life situations and draws upon its store of old innate bodily responses. Such an addition is crudely represented by the following diagram where S is the original effective stimulus and R is the original innate response. $S_{1\text{-}8}$ represent the new conditions of stimulation as shown, for example, in the illustration taken from Watson on con-

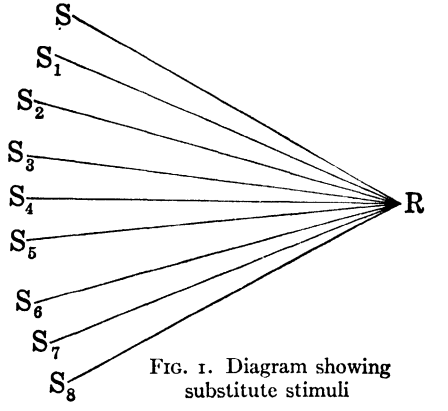


FIG. 1. Diagram showing substitute stimuli

ditioned fears. Instead of S_1, S_2 . . . . S_7, S_8, we can now substitute "darkness," "sight of furry animal," "lightning," according to the following list of effective stimuli for fear (*39*, 58).

BEFORE CONDITIONING

UNCONDITIONED STIMULI—CALL OUT UNCONDITIONED RESPONSE

Loud noise.....
Loss of support....
} Fear

AFTER CONDITIONING

Conditioned Stimuli—Call Out Unconditioned Response	
Darkness	Fear
Sight of furry animal	
Sight of family group who cackle and laugh	
Flash of lightning	
Sight of moving toys	
Sight of father (who storms at child)	
Sight and touch of water (due to loss of support)	
Sight of high places	

The extension may also take place on the side of response. The gross situation—conditions of stimulation—may remain wholly unchanged, but new responses may appear. Such an extension may be represented by the following diagram in which R is the original response and S is the original stimulus. $R_{1\text{-}5}$ represent new responses. Here

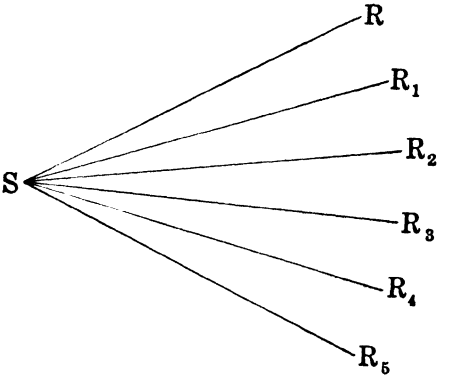


Fig. 2. Diagram showing substitute responses

it is as if one were to put a slug into a machine, expecting to secure a stick of gum because that has been the output of the machine upon previous occasions, but actually receiving instead a banana, a pencil, a box, a penny or a knife. To the situation that should legitimately (innately) call out anger we may get instead, under conditioning, a smile, a glance of scorn, a look of sorrow or a grimace of pain. It would seem that any response may be tied up with any stimulus.

The Behaviorist's Use of the Reflex. All this is done in terms of the simple concept of reflex action, which for a long time, so we know, was the property of the physiologist and which, within limits, did very valuable service for him. But the behaviorist appropriated the concept.[1] He lifted it bodily out of the field of physiology and extended

[1] Woodworth points out that "as a methodology, behaviorism is almost purely negative. It stresses objective methods, which were already in actual use, but first it made no attempt to introduce new objective methods. A little later, to be sure, it proposed to introduce the conditioned reflex method; but although the conditioned

enormously its meaning to satisfy his own demands. He has been accused, however, of being too easily satisfied when he transported the concept from physiology to psychology and labeled all modifications induced in the reflex either positive or negative conditioning. We have known, of course, for a long time that men learn; that they actually grow up and put aside their childish ways; that under the same physical conditions with increased age they no longer have tantrums as they formerly did; that many new and unlike ways of acting under the same situation are acquired, or that many different situations may lead to the same sort of activity. It has long been recognized, for example, that an individual may learn, with training, to be courteous under the most diverse situations. Again, we know that where the stimulus is the same, as for instance, in the case where the question, "What is your name?" is raised, one may speak a word, write it with his left or with his right hand, trace it in the air or in the sand with his cane, his foot or his nose. The response varies greatly, although the same end is attained.

Contribution of Behaviorism. It would appear, on the whole, that the behaviorist has not contributed anything essentially outstanding or revolutionary by way of fact in his treatment of conditioning. To call learning "conditioning" does not add to our understanding. The behaviorist has offered a new word for learning and has spoken in terms of stimulus and response instead of material to be learned and learned actions. He has contributed, however, a very great deal to psychology by his insistence upon the use of standard methods of observation. He has been objective; and this one feature alone, when considered in connection with many of the unverifiable speculations of some of the so-called "subjective" psychologists, more than recompenses for whatever shortcomings may be found in the field. The status of any science is determined in part by its methods. Behaviorism in so far as it stresses the employment of proper methods of measurement and procedure is a highly satisfactory manner of studying the human individual or animal. The same is true for the other fields of psychology in which reliable measures of achievement are secured. The whole field of *mental testing*, which is far from being behavioristic, illustrates this point quite well.[1]

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reflex has proved a very interesting phenomenon, the conditioned reflex *method*, thus far, has scarcely gained a foot-hold, at least in human experimentation. It appears to be more tricky and less controllable than the equally objective verbal response method, which had long been employed. Methodological behaviorism offers nothing that is characteristic on the positive side" (*45*, 259).

[1] "There is no inherent connection between the behavioristic program and methodological objectivism. Certainly the behaviorist must stress the objective method, but he might perfectly well admit introspection in some parts of human psychology. On the other hand, one might be a thoroughgoing objectivist without taking any

In short, we believe firmly in the value for psychology of reliable methods of procedure. To the extent to which behaviorism, for example, contributes in this direction, it is a laudable field of psychological enterprise.[1] But one should be careful not to confuse behaviorism *as a working program* with many of the highly speculative interpretations which have been formulated by some outstanding members of the school. One must not take theory for fact. It may be that in his endeavor to provide foundations for his field, the behaviorist has been led, at times, into waters of speculation just as deep as those of the subjective psychologist. He has pulled many of the unthinking and the ignorant in with him.

In closing our discussion, let us point out that ambitious attempts have been made to extend the concept of simple reflex conditioning to include all phases of life: social, economic, industrial, political, ethical and legal. The concept also serves, we are to believe, to explain our memories, imaginations, emotions, customs, morals, our language, our criminal acts, and our mental disturbances. All of one's life, regardless of its complexity, reduces to the terms of stimulus and response. Thus the categories of the behaviorist are *few* in number but, as we have seen, the *offices* which they would serve are *legion*. Consider the above illustrations. Memory refers to the fact that habits are retained; imagination and thinking are mainly forms of verbalization; emotions and the thousands of related activities are called "gut" responses; and insanity is quite easily explained in terms of habit twists. Ethics, morals, religion and the like are habits of the group (of the various individuals of the group) essentially of the same order as smoking or eating. The whole complex problem of development consists in the substitution of new stimuli for old responses and new responses for old stimuli. Racial as well as sex differences are due to differences in habit formation. The brown man merely has habits which are different from those of the black or white man. The male has different habits from the female and so on. If our space permitted, we could treat at great length each of these various behavioristic attempts to deal with the individual. But as it is, we must rest content with our very brief survey of this interesting field. We continue now with a different point of view and with a different school.

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special interest in the behaviorist's program, as we see in the case of the worker with the mental tests" (*45*, 260).

[1] In referring to work of behavioristic psychology, Woodworth remarks: "One would be proud to be the author of any one of numerous investigations made by behaviorists. One need not be a behaviorist to admire them. One need not have been a behaviorist to have made them" (*45*, 264).

CHAPTER III

PSYCHOLOGICAL SYSTEMS (Continued)

PSYCHOLOGY OF *GESTALT*

In our preceding discussion of the various systems of psychology we have found emphasis laid, on the one hand, upon the mental and, on the other hand, upon the bodily side of the psychological organism. In structuralism we found an attempt to reduce mind to simple constituents; and in functionalism a noticeable disregard of mental structure with a disproportionate emphasis laid upon functional aspects. In behaviorism, we found a highly abstract account of the psychological activities in terms of hypothetical reflex arcs and muscular and glandular functions, with a wholesome tendency in some quarters to render a more sensible description of behavior patterns. We found credit given in these latter accounts to the directive influence of the individual's goal upon the course of the activity. We turn now to a brief consideration of a form of psychology in which both mind and body are accepted as playing a part in the psychological activities.

The Meaning of *Gestalt*. Within recent years psychology has witnessed the rise and development of the doctrines embodied in what is known as *Gestalt* psychology. This particular school of psychology originated in Germany; thus the word *Gestalt*. The English equivalent of the term is form, pattern, configuration, or shape. The data of this school, which are largely phenomenal patterns, forms, objects, are said to be given in direct experience; that is to say, they *are* the experienced features of one's environment. Or they are what the behaviorist would set down as effective extra-organic stimuli. "When I talk of direct experience," Köhler, who is an outstanding figure in this field, tells us, "the word is always used in this meaning; *e.g.*, a chair or something out there, hard, stable, brown, generally without any taint of being perceived by me or of being a subjective phenomenon." The ordinary chair, or for that matter any object of the environment, considered from the above point of view, is a form, or a structure, or a whole. Since there are so many thousands of environmental objects, both organic and inorganic, we should accordingly expect to find a great many *Gestalten*, structures, or wholes. And we do find, in fact, many different

sorts. To cite only one sort of classification, there are physical, physiological, chemical, and psychological or experiential structures.

The Origin in Work of Wertheimer. The immediate origin of this particular form of psychology and likewise the occasion for many of the more important experimental investigations since done in this field was a study by Wertheimer (*43*) upon the visual perception of apparent movement. In this study Wertheimer took as his principal objects two lines set parallel or at an angle. These were presented to various subjects in a definite temporal sequence. The interval or the pause between successive expositions of the two objects was found to be of great significance. When the interval was approximately 200 *sigma*,[1] the objects appeared *successively*. One came and disappeared; then the other came and disappeared. When the time was very short—around 30 *sigma*—the objects were seen *together*, as parallel lines or as forming an angle. But when the rate was around the optimal period—about 60 *sigma*—the one line moved back and forth across the field. Thus the temporal interval served to *determine* the spatial as well as the temporal relations of the two stimulus-objects. Temporally, we have the three stages: Succession, Simultaneity, and Movement. Spatially, we have the objects disjoined; together, forming parallels or an angle; and patterned to produce a single object that moves back and forth across the field. At times, not even an object, as an object of definite dimensions, could be seen. One saw that something moved or, stated differently, that there was movement. This movement, without an *object* being seen Wertheimer called the pure *phi*-phenomenon. Ordinary *phi* refers to all those experiences of movement where nothing in the object (physical conditions) corresponds to the actual experienced movement, as in the perception of the movies.

Physiological Basis of Apparent Movement. The visual experience of movement is highly integrated, so we are told. It is a whole. It is not divisible into simpler parts. It is, in short, a *Gestalt*. Since it is not made up of such things as sensations and the like, "we must abandon any attempts to explain it by one of the customary psychological theories, completion, or elaboration of sensations by the so-called higher functions" (*19*, 269). Wertheimer sought to explain this interesting phase of experience (apparent visual movement) in terms of unitary physiological patterns; that is, in terms of a neurological *Gestalt*. His speculative cerebral explanation shows certain attractive features. It is novel, and it is, no doubt, partially adequate to the facts. It aids

[1] A *sigma* is $\frac{1}{1000}$ of a second.

one somewhat in thinking, inasmuch as the simplicity of the theory conduces to an easy transliteration into visual terms of unknown physiological events. Let us indicate specifically what appear to be the essential points in the explanation of movement in the doctrine of the *Gestalt*. Assume point *A* in the cortex stimulated by an excitation from receptor organs, and near to it, point *B* likewise stimulated either simultaneously or successively. Now, with these two points given, let us assume further that the brain process arising from the stimulation of point *A* or *B* is not limited to that particular area determined by the stimulus, but that it radiates out from the original point of arousal in all directions, becoming a spatially and temporally extended process.

Streaming out, not unlike rays from a luminous body, or waves from a central disturbance, certain portions of the neural process (provided the intensity of the stimulus is of a given degree) pass completely from *A* to the region *B*. If the cortical distance is traversed by the excitation from *A* without intercepting a similar process from point *B*, we have the so-called successive stage. *A* runs its course before *B* appears. But if we assume that *B* is stimulated after a temporal interval such that the excitation from *A* has not completed its course to *B*, then the two processes will meet, provided the cortical distance *AB* is not too great. Assuming simultaneous arousal and similar rates of outspread for the two, the point of juncture will be half-way between the two regions, and we will have experientially the stage of simultaneity and *neurologically* the simultaneous *phi*-function. We may represent this event in this simple way: *A*————*m*————*B*. When the two excitations meet at *m* (half-way), we see the figures at rest with no movement between them. Assuming, however, that the cortical process from *A* has just reached *m* when point *B* is stimulated, then with equal rates of radiation, the meeting point may be represented by *O* where *O* stands half-way between *m* and *B*, or three-quarters of the cortical distance from *A* to *B*. We may diagram it in this way: *A*————*m*——*O*——*B*. Here we have represented the physiology of the optimal stage.

In all cases the rate of neural outspread is determined by the intensity of the cortical excitation which in turn depends upon the intensity of the objective conditions. If objects are too widely separated, the two excitations will be unable to form a unitary whole, and there will be no movement. If the pause is too long, the same result will follow. And, finally, even though the objects are fairly close together and the pause short, there may be no movement-experience because the intensity is too weak to produce a neural union. Thus we have three

sets of physical conditions; *viz.*, intensity of the stimulus, interstimulus distance, and length of the pause to which correspond (on the physiological side) intensity of the excitation, the rate of flow, and the distance of flow. The relationship found between the three major physical conditions (intensity of object, spatial separation, and temporal interval) is clearly expressed by Korte (*22*). Where i stands for intensity, d for the distance between the figures, and t for the temporal interval, we have, accordingly, the following laws.

d (optimal) varies directly with i
i (optimal) varies inversely with t
t (optimal) varies directly with d

Experience Is Always Patterned. From the above experiments, as well as many others, including studies done upon animals (apes, chickens, rats) in many of which the conditions have been so controlled as to bring to light striking relationships, the position is taken by the *Gestalt* psychologists that all experience, even from the very beginning of the individual's life, is integrated or patterned. It is furthermore maintained that such integrated experience possesses properties or characteristics which can never be reached by the method of disintegrative analysis. For the properties of these wholes, they assert, are in no sense summative. For them, a mere addition of one thing to another never gives a pattern. One may bring two previously unrelated objects together within the visual field where they may produce a pattern —a total meaningful whole; but the whole will be entirely different from the two objects which have been brought together. Huge apes, we are told, will bring a stick into functional relationship with food, forming a total meaningful whole in which the satisfaction of eating plays a part as well as the stick used to secure food. The whole seems actually to possess more properties than the so-called simpler elements. The properties of the whole are different from the properties of the "parts" so that knowledge of such parts does not give us a knowledge of the whole. In the same way that water—the liquid—has unique properties, not describable in terms of chemical atoms, so experience, it is maintained, shows its integrated and unique side.

Every experience, from this standpoint, is a *Gestalt* or a configuration of varying degrees of complexity. If a cross section of experience at any moment is taken, it is found to exhibit, as its most striking character, a highly unified nature. This momentary cross-section constitutes, we may say, an experiential whole. It is an undivided and highly articulated unit which, so far as observation goes, is neither composed

of independent, isolated elements nor experimentally reducible to any such items. The *Gestalt* psychologist lays great stress upon the unique and significant character of such wholes as opposed to the importance of individual parts. We recognize, for example, that children know the face of their friend before they get the hues or shades of facial coloring. We are frequently unable, as adults, to tell whether an acquaintance has blue eyes or brown, light or medium brown hair; and yet we know the person instantly on sight. A face considered from the point of view of *Gestalt* psychology is something quite different, for instance, from a face as treated by the structural psychologist. It is, experientially considered, unquestionably more than a patch (mosaic) of colors and lights. Again, a melody as perceived is more than a mere sum of the tones. The individual tones may remain unchanged, but the melody may change. Moreover, it may be transposed. The melody may remain the same but the tones may change. The melody is a great deal more, according to this way of thinking, than the totality of the individual parts.

Protests against Structural Analysis. It would appear that this psychological division arose, in part at least, as a protest against the atomistic practice of the structural psychologist in seeking to break up the highly unified experiential patterns into simple, separate particles; *viz.*, sensation and the like. We recognize from everyday observation, when we pause long enough to consider the matter, that our psychological lives appear to run on in a highly unified manner. Under ordinary conditions we do not find them broken up in any piecemeal fashion. The configurationist approaches life from this angle and emphasizes the great significance of the clearly organized character of the mental side of our lives. He maintains that an understanding of its unity is far more important, if we wish to secure some insight into the individual's psychological nature, than an understanding of any simple components of mind expressed in terms of elementary sensations.

Opposes Also Behavioristic Analysis. If this psychology takes a firm stand against structuralism with its insistence upon the methods of strict analysis and its elementary mental constituents, it protests just as vigorously against the claims of behaviorism, especially the more extreme forms. Thus it is asserted that any attempt to describe adequately the activities of the individual, either human or animal, in terms of simple neural pathways and functioning sense organs, muscles, or glands is quite futile. Moreover, since it can be clearly shown that one does not proceed about the affairs of life in terms of any such simple bodily structures and functions, descriptive accounts of this nature

possess little significance. They are quite worthless, so far as furthering our understanding of human behavior is concerned.

Gestalt psychology rejects, then, the methods of strict analysis, either structural or behavioristic. But it should not be thought that the psychologist here makes no analyses. His total phenomenal field has to be broken up, else he could never proceed about his daily work. Out of what is given at any one moment, certain parts must be taken and dealt with and other parts momentarily ignored. Certain parts are selected, which means, of course, rejection of others. Discriminations are made as well as comparisons. Köhler makes clear the character of configurational analysis.

> We find the *genuine* parts of the field as segregated wholes and groups and, in these wholes or groups their genuine "parts" again as subordinate wholes or members, whereas the so-called sensations . . . are parts existent only in theory. . . . I may passively accept what I find before me as the sensory field. . . . I may, however, adopt a special attitude with regard to the field, selecting some of its members and more or less suppressing the rest. In many cases a change of organization will be the consequence of such an attitude and hence "analysis" of this sort involves a real transformation of sensory facts in *Gestalt* psychology. Of course an analytical attitude is not the only one by which a change of organization may be produced. When we select certain members of the field, we can keep them together at the same time and so favor one special kind of "belonging together," instead of that which would prevail without our interference. Again the change produced by our attitude will be a real transformation (*14*, 183).

Experience, as it runs its course, is always meaningful and dynamic. It is wholly beside the point to bring out pictures of non-meaning, static sensations and say that these *are* the experiences of perceiving, remembering, loving; or to drag forth quivering muscles and excreting glands and say that they *are* the experiences of imagining, thinking, desiring. Such claims simply do violence to the facts of observed life. Of the way of behavioristic analysis, Koffka has this, in particular, to say, "the application of strict analysis to an animal's conduct at once reduces it to mere mechanics of limb, and physiology of muscle and gland—a *reductio ad absurdum* . . ." (*17*, 21). Any attempt to state meaningful, functional, dynamic relations in terms of non-meaningful, analyzable units would seem to lead nowhere. There is an inseparable gulf fixed forever between these two orders. It is impossible to squeeze meaningless elements together to produce meanings. And just so long as one thinks in terms of simple sensory processes or of reflexes—the first associated and the second chained—one is held back from an under-

standing of the true character of human activity. One can never get the discrete items—mental processes or bodily responses—together without introducing among them some active agent or force which serves to bring them all into unified and meaningful wholes. But, of course, neither the structuralist nor the behaviorist would permit the introduction of any such factor into his system. It follows, then, that there can be but one remaining course to pursue. If one wishes to understand life in its true continuity, one must, of necessity, abandon the further employment of the strict analytical procedure as found in structuralism and behaviorism. Since the whole is what is given in observation, the whole is to be described.

Stresses Integration and Pattern. Instead, then, of the analytical approach to the study of the psychological organism, the *Gestalt* psychologists take the integrative and functional way. "We then begin," it is pointed out, "with the organism in its environment, and study its reactions. Among these we may reckon also those which are usually termed consciousness. I mean the fact that the physical world exists for the organism as its own surroundings—which we refer to as its phenomenal world—though, of course, to the organism these surroundings appear as perfectly real surroundings—and the other fact that the organism also knows itself, feels hunger and pain, rage or lust" (*20*, 153). These reactions are to be described in terms of what the organism feels and what it does.

Illustrations from Apes. The following illustrates quite well the general nature of what the configurationist is trying to get at in his descriptive accounts. Referring to the emotional behavior of one of Köhler's experimental apes, Koffka writes, "Under the influence of strong, unsatisfied emotion, the animal must do something in the spatial direction in which the object of his emotion is situated" (*17*, 20). Descriptions of this sort, he points out, "do not merely tell us that an animal will throw things in a direction which is later to be found approximating that of its enemy; they show us rather, that the animal is *directed upon its enemy* and that every action arising from an emotion is controlled by this direction. Not only do the acts have this direction, but the animal is itself thus directed." A description of this sort is "desirable and, indeed, necessary to understand the animal's behavior." Again, take a description from Köhler of some bit of behavior of one of his apes. One of the large chimpanzees (Tschego) was let out of her sleeping quarters into a large barred cage. A banana was placed outside the bars and beyond the reach of the animal's arm. Sticks sufficiently long to reach the food lay near the bars and inside the cage. The animal

stretched out its arms through the grating in its attempts to secure food, but was unable to reach it. Some younger animals approached the coveted prize. "Tschego caught up some lengths of straw and angled fruitlessly with them. Only after a considerable time as the young apes approached dangerously near to the objective, Tschego had recourse to the sticks and succeeded in securing food with one of them."

In the next test which took place several hours later on the same day the sticks were removed to a greater distance from the bars and placed against the opposite wall of the cage four meters from the grating. They were not used. After useless efforts to reach the bananas with her arm Tschego jumped up, went quickly into her sleeping-den, which opened into the cage, and returned at once with her blanket. She pushed the blanket between the bars, flapped at the fruit with it and thus beat them toward her. When one of the bananas rolled on the tip of the blanket her procedure was instantly altered and the blanket with the banana was drawn very gently toward the bars.

Or, finally, take the description of the behavior of another chimpanzee, Koko.

Koko, who had already tried to use a plant-stalk in the same circumstances, three days later in the course of the test, ignored the stick which lay a little to one side and on the periphery of his "sphere of action." Only after some time did he grasp the stick with his foot, and thus drew the bananas clumsily toward him. On a repetition of this experiment he fetched his blanket and dragged it close to the objective, then let it fall after a short hesitation and took up his stick once more. A day later, when no stick was available, he repeated the same procedure exactly, and then tried to angle the objective with a stone. Some days later he employed a large piece of cardboard, a rose-branch, the brim of an old straw hat and a piece of wire (*15*, 35).

It does appear that descriptions of the above sort seem to come much nearer to an exact statement of what is actually observed to happen than those descriptions in which all reference to purpose, or striving toward a goal, is omitted. As we can see, this description of the *Gestalt* psychologist is quite similar to the behavioristic sort which Tolman seeks to give, or like that stressed by Woodworth as a proper kind of psychological account.[1]

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[1] "Purpose is a real fact in human life and if not purpose, at least striving toward a goal is a real fact in animal life as well. Quite apart from philosophy and striving and their place in the world process as a whole—which is not a psychological question—purpose is one of the phenomena which *psychology* must include in its story" (*44*, 115).

Figure and Ground. The primary task of the psychologist is to describe the many highly integrated patterns or wholes which are to be found wherever we turn in experience. A whole appears to show two outstanding aspects; *viz.*, a figure and a ground. There is always some figure which is experienced in conjunction with some ground. The figure may be auditory, visual, tactual, and so on. In case the figure is auditory, the ground may be a series of loud noises, a continuous noise,

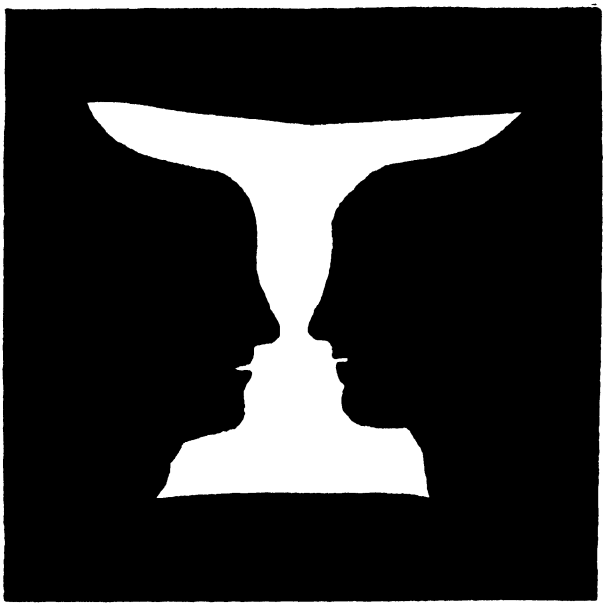


FIG. 3. Face-Goblet Arrangement of Figure and Ground. From E. Rubin, *Visuell wahrgenommene Figuren*, 1921.

or perhaps only silence. In case of touch, the ground may be diffuse organic states or any level of temperature upon which some pressure or temperature is set as a figure. In case of vision, the figure may be a perceived, imagined or remembered object together with its context.

The nature of the so-called figure and ground relation may be strikingly shown by means of any one of the many ambiguous patterns which we find, particularly in the visual field. Take the illustration of the faces and the goblet (See Figure 3). When one sees the faces, they are clearly there; but the goblet is gone—it has become the ground. But when one sees the goblet, the faces are gone—they have now become the ground. In this sort of relationship when one aspect is figure, the other is ground; and *vice versa*. The one is as important as the other. In

neither case is the one reducible to the other or to simpler elements. Modifications in the figure must be accompanied by modifications in the ground. Such modifications may take the direction of some qualitative change in the color or sound of an object, or they may be only quantitative; that is to say, some change in the spatial or temporal characteristics of the object.

Characteristics of Figure-Ground Relations. In every case, both figure and ground possess unique properties. For example, the figure is more "striking" than the ground. It has sharper outlines; while the ground may approach a state of formlessness—a mere extending or stretching out behind the figure. Each experiential whole—figure and ground—possesses properties which suffer losses or gains with those changes in extra-organic and intra-organic conditions which come with growth, with increased knowledge and the like. They have, according to Koffka, "their own laws of being by which are determined the kind of wholes that are stable, the kind that are prone to become transformed and the direction of such transformation. Four different directions of transformation may be distinguished: (1) *simplification*, (2) *structuration*, (3) *unification*, (4) *amplification*." He then proceeds to explain what is meant by each of these:

> (1) simplification: after-images are, as a rule, simpler than the original perceptions, both in outline and filling. Gaps are bridged, contours simplified; as Goethe pointed out, after-images tend to become circles. . . . Descriptively, the circle is the simplest of figures and functionally, it is the end toward which certain simplifying processes are tending. (2) To understand what is meant by structuration we must consider its least degree; this would give us chaos. . . . Compare, for instance, the impression which a painter, an average, educated person, a school boy and a dog have of a painting like Da Vinci's *Last Supper*. Here an increase of structuration goes with an improvement of the reaction: (3) chaos is the least degree of structuration: the least degree of unification is a mere summative connection, a form of cohesion which may be called an *and-connection*. . . . A face, for example, certainly does not appear to a baby as hair and nose and eyes, but as something friendly or nasty; (4) by amplification is meant the fact that perceptive and conceptual wholes tend to become more and more embracing (*20*, 157).

Physical and Physiological *Gestalten*. Following his description of the experiential unities, the psychologist has then to point to similar and related unities which occur in the *physiological* system and in the *physical* order of the individual's environment. Each experiential *Gestalt* has its neurological whole. In other words, there is the bodily basis of the experiential configuration. In turn, the physiological or

neural pattern is assumed to rest directly, but not solely, upon certain well-definable *extra-organic* patterns of physical and chemical energies. These physical patterns of the *outside* world display very definite spatial and temporal characteristics or properties. They are, also, true structures or wholes.

With this parallelism between experiential whole and neurological functions, the order of *actual experience* becomes, according to Köhler, "a true representation of the dynamic order of corresponding physiological processes." In structural psychology we saw, for instance, that each element of mind was assumed to have a definite *physiological* process accompanying it. Here we find a similar state of affairs. The phenomenal object, or event, of experience has its physiological aspect. But here instead of sensations, there are organic wholes, patterns, figures and grounds; and instead of a simple, neural pathway there are very highly patterned functional units. Each of these physiological structures (like experiential structures) possesses unique properties—properties which appear because of the very fact of integration. Since these physiological *Gestalten* play such an important rôle in determining the character and the course of experience, we must consider briefly certain assumptions made concerning them. Let us turn to Köhler for a first-hand account. The first assumption is:

> In the higher animals some parts of the central nervous system are the place of sensory processes, corresponding to the stimulation from without, just as certain fields of the brain in man are shown by an overwhelming evidence from pathology to be the stage of sensory processes. And I use the words "perception of the situation" when I mean the totality of these processes. . . . The second assumption . . . is a working hypothesis about a general property of those sensory processes. Even the behaviorist who formulates his problems in terms of stimuli and reactions must assume that something happens between the former and the latter in the central nervous system. He tends to deny that any specific problems are to be solved in this region, between sense organs and reacting organs. But this also is an hypothesis and a rather vague one, to be sure. One problem at least must be accepted as such. We have conductors between the sense organs, the eye, for instance, and the reacting organs; and these conductors lead from one to the other as a kind of dense network. Either I assume that from one point of the retina one conductor goes absolutely isolated to one reacting organ, a second conductor from another point of the eye again isolated to the same or to another reacting organ, and so on. In this case there is really not much to ask about the intermediate region. Or, I realize that the network is not very apt to be a sum of totally isolated conductors. And in this case I must admit that the simplest rules of physics are to be applied to the network, the processes in

all the others and *vice versa*. "Conduction" between the sense organ and the reacting organs means now a problem of specific process distribution, in its most general aspects similar to problems of process distribution in physics. The third assumption is that the distribution or organization of sensory processes shall not depend upon the constellation of stimuli only but on the total interior situation in the animal, too, so that influences like hunger, fear, rage, fatigue and organization in earlier experience can produce changes in a given distribution (*16*, 154).

Rôle of Whole Organism in Functions. The physical or outside situation (whole) is thus repatterned, in a way, in the higher nervous centers under the influence of the general intra-organic state of the individual. At no time does the nervous system work in terms of simple reflex arcs or pathways. It functions rather as a totality in which changes in any one part are assumed to be reflected in other parts. The processes of neural function thrown into operation at any given moment in one region of the central nervous system directly influence and are influenced by other processes set up in adjacent regions. Consequently, the conditions of external stimulation are never to be understood as being the *sole* determiner of neurological patterns. The intra-organic state of the individual is at all times a very important factor in deciding the nature of the nervous patterns. The neurological patterns represent in reality a product of the conditions initiated at the periphery of the body—in the sense organs—by the stimulus, and the total internal state of the organism at any given moment. A change in either of those two fundamental factors results in a modification in the central patterns. We find, then, that so long as the intra-organic conditions remain unchanged, a fair degree of constancy prevails between the stimulus on the one hand and the experiential and neurological wholes on the other. The *experience* of an object or situation is a kind of mental reflection of the spatial and temporal structures of the environment. We have thus a condition much like the correspondence assumed by the structuralist to exist between simple physical or chemical stimuli and simple mental process. The essential difference appears to exist in the fact that the *Gestalt* psychologist talks of meaningful, configurated wholes and the structuralist speaks of meaningless, analyzed elements.

Summary. We find, by way of summary, that the members of this school of psychology reject the methods of strict analysis because it destroys, it is said, the properties of the experiential wholes with which individuals actually deal in their lives. The behaviorist is attacked because he ignores the significance of experiential items in conduct. The structuralist is censored, too, because his descriptive categories

are so remote from actuality. *Gestalt* psychology, instead, places a major emphasis upon the functional and integrative aspects of experience. The descriptions are given in terms of experienced properties of the environmental field, and in terms of goal, or purpose, in case of striving. Much use is made by this school of such general concepts as "past experience," "attitude," and "set" in order to secure a picture of the contributory conditions of any given structure or pattern. Finally, considerable use is made at times of highly speculative theories concerning the neurological functions.

It appears that in connection with their emphasis upon unity the advocates of this system have made their greatest contribution to psychology. Too often, perhaps, other psychologists have tended either to ignore this aspect of experience or to give it too little credit. On the other hand, in their constant insistence upon unity, integrated pattern and the whole, the *Gestalt* psychologists have perhaps become as abstractive as some of the individuals whom they have sought to criticise. To agree that everything is patterned or structured is quite well; but the bare statement of such may bear little fruit. To the degree to which *Gestalt* psychology contributes to our knowledge of experience, it is unquestionably of great value. The same might well be said of structuralism with its insistence upon the methods of analysis and the resultant products in the form of simple, mental elements.

This school has sought to extend its methods widely over the general fields of perception, memory, learning and the like. It has done good service in the treatment of the problems of the psychology of the child and the animal; and, it has made significant contributions in the fields of abnormal and clinical psychology. A discussion of all these extensions, interesting as they might be, would lead us entirely too far away from our appointed task. We must hasten to complete this discussion of psychological systems by briefly considering one more way of studying the individual, namely, the mind-body way.

PSYCHOLOGY OF THE PSYCHO-PHYSICAL ORGANISM

Introduction. In this hasty review of the psychological systems we have so far discussed, (1) two forms of the psychologies of consciousness in which, in the one form, mind was found to be a sum-total of simple processes, and in the other form, an organic device for furthering the organism; (2) the psychology of behaviorism, in which we found little or no appeal to the experiential side of the organism but great emphasis laid upon the bodily structures and activities; and (3) the psychology of *Gestalt*, in which both experiential and bodily factors are considered

in terms of psychological patterns and configurations. We now wish to discuss briefly another division of this whole field of psychology in which stress is placed primarily upon the functions or operations of the total mind-body organism.

Mind, from this point of view, is not considered so much from the standpoint of analytical composition; neither is it held to be a biological device for adjusting or adapting the individual to its environment. Furthermore, the problems of mental organization do not command the same degree of interest as is found, for example, in *Gestalt* psychology. This school is primarily interested in securing an understanding of the nature of the various complex psycho-physical, or to use Bentley's term, psychosomatic, activities of the organism. It wishes to understand something about the way the functions develop, the nature of the changes induced in them under socialization, their possible limits, how they are disturbed by extra- and intra-organic conditions, and a great many other problems.

Function Is a Way of Performing. Functionalism of this form differs from the preceding sort in terms of an assumed difference in the nature of function. In the first form, function, as we saw, is stressed in terms of the ends accomplished or achieved. Walking as a function considered in this way, becomes a means of escaping from danger, of securing food or of getting safely home. It is as if one were to refer to the functions of his automotive engine in terms of sawing wood, pumping water, or transporting contraband. In terms of the present school, function is taken to mean a mode of operation, or the way in which something is done. Here, to use the above illustrations, walking becomes one way in which the human organism functions. It has, for instance, its history, its changes under socialization, its limits beyond which it cannot go, and its disturbances. Or, take the example of the engine. The engine, we may say, functions slowly or rapidly, shows changes in function with changes in altitude, humidity, and temperature; and is functionally disturbed by the use of improper fuel and wrong methods of lubrication. The first way of considering function looks especially to the end or to the result. The second way concerns itself more with function as a process.

In seeking an understanding of the psychological functions it appears more desirable to many to consider them for their own sake, rather than as a more or less useful way of arriving at some outcome. Thus we are told that,

> To depict a function or operation in its own terms is always better scientific method than to substitute for it its end. To say that printing is a process

which turns out books and newspapers is not descriptive. It gives no intelligible idea as to how the printing press works. . . . To say that one instinct tends to preserve a race and another the individual, tells us nothing about the instincts themselves. It does not even demonstrate the existence of them. To say that one tribe so conducted itself as to survive while a neighboring tribe became extinct gives us no information upon their modes of living (3, 200).

Function Involves Both Mind and Body. According to the present way of thinking, the psychologist seeks to understand how the total organism performs. This means that the function about which we shall speak is not one of consciousness. It is not a function of the mind in which the body is employed in bringing about desirable changes in the world or in adapting the individual. The function is rather one in which two factors coöperate to give us such ordinary, everyday activities as perceiving, remembering, imagining, longing, resolving, and thinking. The psychologist, when he speaks of any of these activities, as well as similar ones, does not mean that there is a perceiver, a rememberer, an imaginer, or a thinker, *within the organism and separate from the organism.* He means that it is the organism which does these enumerated acts. He does not mean that it is just the *body*, the physical structure of the anatomist and the physiologist, which is performing; for he finds that such occurrences as thinking, planning, anticipating, or resolving disappear, under the use of an anaesthetic or in deep sleep, while the bodily functions of digestion, respiration, circulation, and growth go on just the same. Similarly, we find that these psychological activities may be greatly disturbed, while no change can be discovered in the bodily functions.

These functions of a psychological sort which seem to each of us to be so real and so vital are considered as a joint activity of two factors: the one mental and the other bodily. Both are absolutely essential. The removal of the one utterly destroys the operation.

It is the same in principle as if we studied the running of the internal-combustion engine as a performance dependent at once upon suitable materials (steel, brass, iron, aluminum), the mechanically fashioned totality and the expansion of gasoline under a sudden rise in temperature. The running, the performance, the functioning, disappears when anyone of these essential factors is taken away. There remains the study of materials, of mechanical principles and of the properties of gas—all antecedent studies necessary to the thorough understanding of the operation of the machine, but all different from the operation itself. So, too, the physiologist may factor the processes of gastric digestion into stomach and accessory structures, solvents

and the ingested food, all factors necessarily involved, but no one of them equivalent to the total train of operations which taken-all-together make up digestion (3, 197).

Contribution of Body to Functions. Let us now raise the question as to what part the body plays in the joint operations of the psychological organism. We discover, according to Bentley, that it contributes what we may call the vehicle.

What the vehicle is when we look at an object from the window, or hear an acquaintance call from an adjoining room or move to press the lighting button, or turn away in anger from an insulting remark is wholly apparent. The eyes, the ears, the arm and hand, and the general musculature are most obviously involved in these performances; and it requires only a fragmentary knowledge of the nervous system to remind us that neural pathways, brain tracts, latent residues of earlier function and avenues of discharge are also necessary to complete our understanding of the vehicle in perception, memory, action, emotion or thought. In one performance, certain parts of the whole vehicle are most fundamentally called into play, and in another performance other parts, other structures and other functional tendencies. Altogether the bodily vehicle of the psychosomatic functions includes practically the entire physical organism with its racial and individual histories engraved upon and within it.

In the second place, it is obvious that the body supplies *energy*. Along with the general tendency of inanimate nature toward the dissipation and the degradation of energy, runs life with its reservoirs and high levels, converting food into complex substances which are capable of sudden and explosive discharge of energy in the forms of work and heat. Especially the unstable nervous system, with its high sensibility, its rapid conduction, and its powerful releases under slight provocation from stimulus, is capitally designed for the sudden employment, both in the form of neural change itself and in muscular work, of the energetic resources of the organism. Some men speak of a "mental energy" resident in, and expressed by, mind itself; but such a conception of mind is purely hypothetical and wholly unlike the mind, amenable to observation, which we have had under our scrutiny. We shall scarcely, unless we are constrained by our future exposition, have recourse to such a speculative mental or "psychical" energy; for the bodily vehicle appears to be exactly designed to supply the dynamical, or at least the energetic, term in our functional performances. One of the offices of the brain of the higher animals appears to be just to provide enormous stores of material which can, at a moment's notice, be drained of energy at a crisis in emotion, action or thought. A whispered word of startling news, an unexpected tap upon the back in the darkness or a message flashed from a great distance, is sufficient to release within the brain enough energy to sustain for hours together a violent motor agitation of the entire body. For the present at least,

then, we shall regard the bodily structures and activities both as the vehicle and as the source of energetic changes in the functional performances with which we are now to be concerned (p. 191).

Contribution of the Mind. To this functioning of the total psychological organism we find that mind makes a very significant contribution. We all recognize that we are unable, when asleep, to carry on in the same manner as when awake. We find that there is something more to our daily experiences than can be set down in terms of flesh and blood. It is the mind, not the bodily structure, to which we attribute the "something more" which is present when we experience the world about us. When we raise a question as to the character of the part which mind plays in this joint activity we find the answer summed up in one word—meaning. The term is a very common one. "What does a thing mean?" we constantly wonder. Or we worry, "What meaning will be given to my actions?" Wherever we turn we come upon this word. It would appear that the eternal quest both of young and old is for the meaning, or the significance of objects. And only through the mental, it is pointed out, do we secure this meaningful reference to objects around us. Meaning, according to this point of view, represents the unique contribution which mind makes to the psychological performances and the accomplishments of the organism. Without it there would "be no apprehension of the past, present and future; no distinction between now and then; no collection of relevant materials out of different contexts—only the unapprehended flow of events."

Are There Many Psychological Functions? We have spoken of *functions* and not *function*, thus implying that the organism operates differently upon different occasions. This means that it does not have one, but several ways of performing. What are these various forms of mind-body functions? What are the fundamental modes of operation? Are there definitely and distinctly different ways in which man accomplishes the thousand and one tasks of everyday life? Is each thing done in a peculiar and unique manner, so that for a thousand tasks accomplished there are a thousand psycho-physical functions? Or, does he possess a few outstanding and characteristic modes of conduct, under which the many activities of life fall? We recognize quite well that man has but *one* organism. Yet he literally performs thousands of tasks. He has but *one* body, yet it exhibits, as we know, several distinctly differing activities, such as digestion, respiration, circulation, excretion, reproduction. May the same be said to be true of the psychological activities?

Functions Are Not Observable. This is a very difficult problem. It is rendered especially difficult by the simple fact that, contrary to the usual belief, we cannot observe function. That is, we cannot see, hear, or feel functional events. Common sense tells us, we know, that we can, for example, see a child pumping water, a horse pulling a wagon, a car running along a road, a man building a house, or a bird constructing its nest. But common sense, we have discovered, is not science; or rather, common sense is not always to be trusted. Take any one or more of the illustrations just cited and attempt to set down what you actually observe. Let us consider here, for instance, the case of the child pumping water. You may see the pump handle going rapidly up and down, and, perhaps, the rod which extends into the well moving up and down. You may even see the water running from the spout. But here is the rub, and it is not purely academic. While all these—handle, rod, water—may be found in the operation of pumping they are not at all the pumping as function. To make the point clear, we have merely to assume, first, that the well is empty; and second, that a hose has been inserted into the pipe and is throwing water from the spout. Let the child cease its labored efforts, and the flow of water continues just the same. If it were a true case of pumping, the stopping of the movements of the handle, that is to say, removing *one* of the necessary factors, would cause the flow of water to cease. But it continues to pour from the spout. The child was then not really pumping water. And it should be understood that what holds true in this case is essentially true of any form of function; including, of course, the psychological as well as the physiological and physical.

We discover then that we cannot advance directly upon the psychological functions for purposes of understanding and classification. They simply elude us. To use a rough analogy, it is like turning up a light to see how semi-darkness looks. We may reach out in our attempt to understand this phase of life and seize hold of some bit of throbbing activity. But when we open our hand to see what lies within, we find only "bare," non-functional constituents—the mental components of the structuralist or the movements of the behaviorist. Since we are denied access to the functions from this angle, it means that we must make a different approach in our study of the various psychological activities. We shall not seek to come directly upon them. Our study rather will concern changes in the various activities as witnessed, for example, by increases or decreases in output or changes in the object or event seen, heard, and the like. It will have to do with a statement of the conditions which at any moment influence the organism. A task

is set for the organism, and a measure is secured of the resultant activity in terms of the objects perceived, learned, remembered, and the like. If our study is largely genetic, we may compare the range of perception (number of objects seen) in the same individual at different age levels or among various individuals at different levels of development.

It is a difficult, but not at all an insuperable task to determine how much the human organism can do under a given set of conditions. That is, a measure can be secured of the degree or extent of output in terms of accepted units. Standards or norms of performance can be established by means of which some comparative statement of a particular performance can be made. We can then say that the individual has more or less than another individual of any given functional ability. The work of the differential psychologist, for example, appears to rest to a considerable degree upon the assumption that individuals vary and that the nature and the degree of variation can be measured or determined. We recognize that under fatigue, the administration of drugs, improper ventilation, great hunger, thirst, or sleeplessness, the functional abilities may change. By taking measurements under "normal" conditions and comparing them with the results from performances under such conditions as the above, it is possible to determine the degree of functional impairment attributable to such conditions. We see here the great significance of a functional view as contrasted with the structural point of view. From the functional point of view we can speak of the effects of smoking, overwork, alcohol, upon activity. We can trace out how the various functions develop with age, how they change under socialization, and how they suffer under old age. We have thus opened up a way of approaching the everyday problems of the business man, the educator, the social and the personnel worker, and the clinician.

In *Chapter One* we pointed out a very old classification of human activities. We saw that, according to this way of thinking, the individual is one who *does* things, who *enjoys* things, and who *knows* things. Here we have a start toward classification. We are quite sure that the organism functions in these three ways. Moreover, it appears that these large classes include within their broad limits all of the activities of the organism. It should be clearly recognized that any attempt to divide up the activities of such a highly unified organism as the human must be quite arbitrary. The organism does not function in a single way at any given moment any more than an animal may truthfully be said to digest during eight hours per day, to respire for a second eight hours, and to reproduce and to carry on such functions as circulation and excretion for another like period. The animal may, and

probably does, do all of these during the course of a short time. In most cases, they are undoubtedly concomitant rather than sequent. The same statement holds for the psychological activities of a human being. He may be behaving in two or more unlike ways at the same time. He may be enjoying what he is doing; or he may "work" and think at the same time. One psychological function does not come to an abrupt end to be followed by other functions. Operations go on; they are events. One form may cease while another continues. It is obviously true that during one's waking life one continuously functions psychologically. As a rule, each function is very intimately related to all others.

Classes of Psychological Functions. Of the various kinds of psychological activities, or functions, which stand as subheads under the gross divisions of doing, feeling, and knowing, the first to appear in the life of the individual is perception. Perception, we say, is an outstanding way of getting knowledge about the objects around one. Through its employment we secure information of the qualitative, spatial, and temporal characteristics of surrounding objects and events; in addition, a great deal of information is derived about the condition or state of our own bodies. We find ourselves dizzy, out of breath, hungry, fatigued, or intoxicated. But the organism has non-perceptual ways of securing knowledge about objects and events in terms of temporal or spatial settings different from those of the *present moment*. It may, for instance, remember a friend. The friend remains the same—he does not change to a stranger—but he is now experienced through a different activity. In perception, use is made of the various receptor organs as well as the central nervous system. In memory, as of a friend, the central nervous system is drawn upon. The same central nervous system may again function by way of imagination—to give us objects as in the future or merely as supposed. We may have old, familiar objects in a future temporal setting or in no time setting at all. Just as in a day-dream we may move in neither the yesterdays nor tomorrows, so in the same way, we may have strange and bizarre objects existing, perhaps, in no time setting. In all three ways we secure knowledge of objects and events in the world; that is, we perceive objects, we imagine objects, and we remember objects.

Not only may the organism perceive, remember, or imagine the objects of its world but it may also act with reference to them. We may perceive and act immediately. The two functions may be so intimately tied up that to perceive is but to act. If we take a sampling of the thousands of our daily actions, we can better understand how closely perception is tied up with action. We see this relationship in such simple

cases as the reaching for a perceived book on the table; for the perceived screwdriver on our work-bench. We see it in the highly complicated performances of the juggler, or in games of manual skill. But it should be clearly understood that these two functions are not identical. We may repeatedly perceive without any accompanying action. Perception in no way necessitates action. If it did, most of our difficult problems of training would disappear. We should merely have to create the proper situation, and actions would of necessity follow. It may be that no action follows perception because the situation now calls for some alternative. The situation is perceived, for instance, with the meaning that either the one thing or the other is to be done. I may, for example, take this road or I may follow that one. Where some choice is to be made or some deliberate selection is demanded, we may find great conflict and perhaps long-delayed action. It may be that in a moment's perception some course of conduct is determined upon that necessitates delaying all action until many years have passed. In this ability to set up a determination to do something after the lapse of a period, greater, perhaps, than the average life span, we find one of the highest forms of human achievement. In this connection the human organism seems to possess certain abilities not found in the infra-human. Finally, it may be that no action eventuates from perception because the situation simply does not call for action. We know that to some men the perception of an elderly person experiencing difficulty in crossing a street does not call for any action. The perceiving individual, we say, has not had his perceptions in such situations tied up with action. Again and again we perceive under a sort of "neutral" attitude, so far as action goes. There is simply nothing to be done.

At times the individual may perceive with some action called for, but he is immediately unable to carry out any such action. Under such conditions one may experience those clear, organic seizures known as the emotions. We may see, for instance, a child on the car track when a train is approaching rapidly a mile or so away. We pick up the child and carry it to safety. There is no emotion. But again we see the child on the track with the train approaching. We cannot get to it in time. We can do *nothing* to solve the situation. We are overwhelmed, we say, by emotion. Speaking generally, it seems that so long as the individual is able to carry through the old, habituated patterns to resolve any situation which may arise, no emotional excitement appears. Back of this fact stands the methods of fire and safety drills in schools and at sea. Much emotion is thus avoided by having highly habituated patterns set up, by virtue of which our organisms are able to function uninterruptedly.

Understanding and Thinking. We find, finally, that the individual is able not only to perceive, to remember, to imagine, to act, and to be emotional; but he is also able to understand and to think. He has many topics under which he is able to subsume the many forms of knowledge which he gradually acquires through perception, memory, or imagination. Much of our education appears to consist in the establishing of new topics of thought or in changing old topics through the addition and the subtraction of many facts and principles. One way of modifying topics is through thinking or reasoning. We know that we occasionally face situations, the solution of which involves the use of the head. We must think them out. If we are industrious and if we have a fairly wide range of factual material and if we do not bring in ethical, moral, economic, or other rules to stop the whole process, we shall probably eventuate with some new bit of knowledge, some new opinion or belief. Such are the products of hard thinking.

We discover then that the human individual exhibits a limited number of psychological abilities. He acts, he has emotions, and through perception and thinking he discovers facts about the world which are understood to a greater or less degree, depending upon his heredity, his individual history, and the momentary state of his organism. About each of these we shall later speak in much greater detail.

We reach the end of this psychological journey with a sigh of relief. We have covered much and suffered for it. But we have seen. You have been guided, and your guide stands partly responsible for what you have seen. He has sought, as we have journeyed along, to give you brief glimpses of ways that lead, now upon the one side, now upon the other, to the psychological regions that beckon one on. We saw the *way of all mind* that followed straight, led up to the pure, serene and non-fleshy abode of the structural psychologist. From here we could look down upon the field of the functional psychologist in which mind was seen as a taskmaster, relentlessly driving the laboring organism along the paths of progress. Very frequently we saw that mind would be forced to take the organism by the scruff of the neck, so to speak, and lift it over the more dangerous and difficult places. Farther on in our journey we came upon the *way of all flesh.* Flung high over the portals was a timely warning to the traveler. We paused and read in bold-faced letters: "*All mind abandon, ye who enter here.*" Exploring a bit along the trail we discovered *objective methods* busily engaged in digging up facts to construct a worthy home for psychology. We lingered a bit to admire the builders and their work; and then withdrew. No sooner had we resumed our march than we came upon the *way of all*

wholes. Across the pathway was set a large sign. We stopped and read with satisfaction: *There is no separation or parting here; life is one continuous whole.* We might have tarried here a little longer, but our time was short; and while we could not make a thorough examination, we found evidence to indicate that what the sign said was wholly true. Back upon our journey, we came after a time upon the *way of all organism.* Upon exploring a bit we saw experience, riding in its bodily vehicle, coming down the path to meet us. There was something strangely familiar about it. Upon coming closer we found that it was ourselves meeting us; whereupon we went home to think upon, "visceralize" over, and *Gestalt* about the various ways of psychology.

During the remainder of the semester we shall be devoted to all of these ways in so far as they may meet our demands; but strictly wedded to none. We intend to start with the organism (be it mind, body, or both) as the product of a long history which we shall briefly depict by way of discussion of the doctrine of evolution. We shall then be forced to look to the animal for an understanding of some of the antecedents of the psychological functions of the human organism. We shall try to give a brief picture of man considered racially, in order to throw some light upon the present stock. We shall seek to show how the various psychological abilities develop in an individual with an increase in age, and how they are socialized with the passing of the years. We shall consider the individual as he functions abnormally, either under a lack of "proper" heredity or under a "bad" environment. We shall go with the organism into the factory, the school, the merchandise shop, the court-room, the clinic and the "insane" asylum. After such a survey we may perhaps possess some glimmer of understanding of this psychological organism of ours.

BIBLIOGRAPHY

1. Angell, J. R., *Psychology*, 1908.
2. ————, "Behavior as a Category of Psychology," *Psychol. Rev.*, 1913, *20*, 255.
3. Bentley, M., *The Field of Psychology*, 1924.
4. ————, "Major Categories of Psychology," *Psychol. Rev.* 1926, *33*, 71.
5. Cameron, E., *Educational Psychology*, 1927.
6. Carr, H., *Psychology*, 1925.
7. ————, *The Differentia of an Emotion*, Wittenberg Symposium, 1928.
8. Claparêde, E., *Feelings and Emotion*, Wittenberg Symposium, 1928.
9. Dashiell, J., *Fundamentals of Objective Psychology*, 1928.
10. Davies, A., "Influence of Biology on the Development of Modern Psychology in America," *Psychol. Rev.*, 1923, *30*, 164–175.
11. Howard, D., *Functional Theory of Emotions*, Wittenberg Symposium, 1928.

12. Hunter, W. S., *Psychologies of 1925.*
13. Judd, C., "Evolution and Consciousness," *Psychol. Rev.*, 1910, *17*, 77–97.
14. Köhler, W., *Gestalt Psychology*, 1929.
15. ————, *Mentality of Apes* (Translated by Winter), 1925.
16. ————, *Psychologies of 1925.*
17. Koffka, K., *The Growth of the Mind*, 1924.
18. ————, *The Psychologies of 1925.*
19. ————, "Perception of Movement in the Region of the Blind Spot," *Brit. J. of Psychol.*, 1924, *14*, 269–274.
20. ————, "Introspection and the Method of Psychology," *Brit. J. of Psychol.*, 1924, 15.
21. ————, "Perception: An Introduction to the Gestalt-theorie," *Psychol. Bull.*, 1922, *19*, 531–584.
22. Korte, A., "Kinematoskopische Untersuchungen," *Zeits. f. Psych.*, 1915, *72*, 193–296.
23. Lashley, C. S., "Behavioristic Interpretation of Consciousness," *Psychol. Rev.*, 1923, *30*, 237–277; 329–353.
24. Prince, M., *The Psychologies of 1925.*
25. Smith, S., and Guthrie, E., *General Psychology in Terms of Behavior*, 1921.
26. Titchener, E. B., "Postulates of Structural Psychology," *Psychol. Rev.*, 1898, *7*, 450.
27. ————, "Problems of Experimental Psychology," *Amer. J. of Psychol.*, 1905, *16.*
28. ————, *Textbook of Psychology*, 1910.
29. ————, "Psychology as the Behaviorist Views It," *Proc. Amer. Phil. Soc.*, 1914, *53*, 1–17.
30. ————, "Prolegomena to a Study of Introspection, *Amer. J. of Psychol.* 1912, *23.*
31. ————, "Structural and Functional Psychology," *Phil. Rev.*, 1899, *8*, 290–299.
32. Tolman, E., "Purpose and Cognition," *Psychol. Rev.*, 1925, *32*, 285.
33. Washburn, M. F., "Introspection as an Objective Method," *Psychol. Rev.*, 1922, *29*, 89.
34 Watson, J. B., *Psychology from the Standpoint of the Behaviorist*, 1919.
35. ————, "An Attempted Formulation of the Scope of Behavior Psychology," *Psychol. Rev.*, 1917, *24*, 329–352.
36. ————, *Behaviorism*, an Introduction to Comparative Psychology, 1914.
37. ————, "Psychology as the Behaviorist Views It," *Psychol. Rev.*, 1913, *20*, 158–177.
38. ————, *Behaviorism*, 1924.
39. ————, *The Ways of Behaviorism*, 1928.
40. Weiss, A., "A Set of Postulates for Psychology," *Psychol. Rev.*, 1925, *32*, 83–87.
41. ————, *Theoretical Basis of Human Behavior*, 1924.
42. Weld, H. P., *Psychology as Science*, 1927.
43. Wertheimer, M., "Ueber das Sehen von Bewegung," *Zeits. f. Psych.*, 1912, *61*, 161–265.
44. Woodworth, R. S., *The Psychologies of 1925.*
45. ————, "Four Varieties of Behaviorism," *Psychol. Rev.*, 1924, *31*, 259.

PART II

Problems of Development

CHAPTER IV

THE DOCTRINE OF EVOLUTION

A fire mist and a planet
A crystal and a cell,—
A jelly-fish and a saurian
And caves where the cave men dwell—
Then a sense of law and beauty,
And a face turned from the clod;
Some call it *Evolution*
And others call it *God*.

—*Carruth.*

INTRODUCTION

Contemporary man has had a very long history. He truly stands today as the "heir of all the ages." The tremendous forces which have operated to mold him in his present form reach back through the long stretches of time to those remote eras now shrouded in the mists of antiquity. Many of these early ages are as the pages of a mutilated book to our understanding. Out of an intense desire to know and to understand, man has diligently sought to turn the "leaves" of this stupendous "book" and read the fascinating story as set down by the master hand. So many pages are missing, and the writing is evidently so old in many places that man is repeatedly forced to complete the account by way of his imagination. Since it is denied to him to know directly, he must draw upon other ways of deriving an understanding of this interesting problem of the antecedents of contemporary forms. He becomes a guesser; he formulates hypotheses to the best of his ability in the light of what knowledge is available. Since abilities and degree of knowledge differ rather widely, we should expect to find differences such as will be found in the following interpretive accounts of the nature of man's history.

Our task in this course is to treat of the human organism. But inasmuch as it appears that the development of man is apparently but one phase of a much more extensive and universal series of events (just one current in a much broader stream), let us first consider the various ways of accounting for man's setting—for the world and all of its objects. Once possessed of a proper perspective of the development of the whole we are in a much better position to come to closer terms with man himself in his developmental moments.

Some Attempts at Explanation. Man has been extremely fertile in the production of ways of accounting satisfactorily for the nature and order of things as they are. Some of these ways are indicated below. Since it is actually impossible ever to relive any historical event as it occurred, it means that each of the following attempts is to be considered at its face value; that is, not as something to be taken as a final or last word upon the matter. Each represents, rather, a whole-hearted attempt to arrive through the means given, at an approximate statement of what took place in those far-distant ages.

One of the very earliest developmental accounts of the natural order is given in the Mosaic story of special creation, as outlined in the first chapter of Genesis. Here is, indeed, a marvelous account. A story, we know, that stirs the blood and fires the imagination of the reader. Set down here is an account of an orderly (temporal) series of creative acts with man placed at the end. Back of the whole process stands the Creator. To such a view, so far as it goes, no true *scientist* can ever find serious objection. The account is sketchy, it is true, but it cannot be proved to be wrong. As far as anyone actually knows, the Creator stands as the dynamic force back of all natural processes and phenomena. The above account, however, is obviously non-scientific. It is quite reasonable to expect, therefore, that many should seek other and more satisfactory explanations.

To Cuvier, who formulated the cateclysmic or catastrophic explanation, we owe one such attempt. Cuvier, aside from being very religious, was quite outstanding as a comparative anatomist and paleontologist. He realized from his own investigations that many plants and animals, quite unlike contemporary floral and faunal forms, must have existed at much earlier times. He sought to account satisfactorily for the existence of these forms of past life. He postulated a theory, the major assumption of which was that during the past ages there had occurred upon the face of the earth a series of widely spaced catastrophies of fairly universal scope and of indescribable violence. Each such cataclysm was marked by the total destruction of all life within the limits of the phenomenon. Subsequently, a new creation or perhaps the influx of unmolested forms in adjacent sections restocked the devastated region. The remains of the exterminated stock give us our deeply imbedded fossils, of interest alike to the collector and the paleontologist. But this interesting and thoughtful attempt of Cuvier finds little acceptance today. It has been supplanted by the theory commonly known as evolution. Evolution is a modern term for the same fundamental processes *referred to* in the book of Genesis. It is a *naturalistic*

attempt to read order and sequence into the history of the universe and all it contains, including man himself. We turn now to a brief consideration of this widely discussed explanation concerning the development of things.

The Meaning of Evolution. The doctrine of evolution has many meanings. The diverse views and ways of thinking in the various sciences make it impossible to formulate clean-cut definitions. Generally speaking, it would seem that the term refers to a sequence of events which are temporally extended and causally related. There are many steps: a first, a second, and, finally, a last. The movement, while probably neither uni-linear nor uni-directional, is always, from first to last, continuous and unbroken. It is, above all, not a series of discrete events which, by chance, occur successively. It is orderly change with each preceding change causally determining subsequent changes. Each step is definitely related to every other step in terms of cause and effect. Here we have a dynamic process in which the character and order of things are inexorably changed with the passage of time. It is a process that cannot be swept back, made to stand still at a command, nor legislated away by politicians. Moreover, while the forces operative in inducing changes in the course and direction of the process may be either external or internal to the series, the evolutionist would maintain that, on the whole, the determining factors are more internal than external. If hydrogen and oxygen unite to form water, the properties of the water, although quite different from the properties of the individual elements, are determined by the character of the elements themselves and not by something laid upon the elements from the outside. Determination, here, is relatively, not absolutely, intrinsic rather than extrinsic. Some would maintain that the properties of the resultant cannot be predicted from a knowledge of the antecedents. There is strict continuity; yet under development something entirely new actually appears; and the new cannot be reduced to its antecedents. The new, or the properties of the new, are said to be emergent. This particular concept of development passes under the name of emergent evolution. One of its very ablest exponents is Lloyd Morgan of England. He writes:

> Evolution, in the broad sense of the word, is the name we give to the comprehensive plan of sequence in all natural events. But the orderly sequence, historically viewed, appears to present, from time to time, something genuinely new. Under what I here call emergent evolution stress is laid on this incoming of the new. Salient examples are afforded in the advent of life, in the advent of mind, and in the advent of reflective thought. But in the physical world emergence is no less exemplified in the advent of each new kind

of atom, and of each new kind of molecule. It is beyond the wit of man to number the instances of emergence. But if nothing new emerge—if there be only regrouping of preëxisting events *and nothing more*—then there is not emergent evolution.

The essential feature of a mechanical—or, if it be preferred, a mechanistic—interpretation is that it is in terms of resultant effects only, calculable by algebraic summation. It ignores the something more that must be accepted as emergent. It regards a chemical compound as only a mere complex mechanical mixture, without any new kind of relatedness of its constituents. It regards life as a regrouping of physico-chemical events with no new kind of relatedness expressed in an integration which seems, on the evidence, to make a new departure in the passage of natural events (*31*, 1 ff).

Where Does Evolution Occur? When we ask what evolves we find the answer given, by some, in terms of three orders: namely, the physical, the biological, and the psychological; or, expressed differently, matter, life, and mind. Some would maintain that evolution has occurred separately within each of these divisions but not between them. The physical, according to this way of thinking, is a closed system which cannot lead to life. Life, in turn, is unique, with its own laws of development, and is an order different from the psychological. The psychological order is again a closed system, for at no time do we find a hint of the "physical" in it. It cannot then be traced back either to the purely biological or to the purely physical. Other individuals maintain that the organic forms of life have developed from purely physical and chemical materials, and have, in turn, given rise to the various forms of psychological life. The whole universal system is one. Evolution started with inert and non-living or inorganic elements, passed straight into the living or organic forms, and continued to determine, finally, the psychological character of the organism. While the first two, the physical and the biological, are not as significant for us as the last, we must give a brief moment to each in order to create the whole setting. We shall try to advance, very briefly, certain forms of evidence pointing to the processes of evolution as found in each of these divisions.

INORGANIC EVOLUTION

We realize that the doctrine of evolution is not the peculiar property of any one science. It is common coin today with all. Every science has been profoundly influenced by this way of thinking. With this in mind, let us speak briefly of the process of cosmic evolution. Consider, for example, the Nebular theory concerning the formation of our own solar system. Here, the assumption is made that nebulae composed of atoms, slowly cooled from an earlier state of incandescent heat, con-

tracted and began to rotate. Under rotation, masses of varying size were detached and cast off, which, together with the remaining central mass, gave us the sun and the planets of the solar system. With long passage of time they have arrived at their present state. This picture of the development of our solar system has long been held as a true account. Some students would maintain, however, that the course of solar evolution has been somewhat different. The planetesimal theory as advocated by Chamberlain and Moulton, for example, suggests that each of the various planets was formed by the passage of some star near the sun, resulting in the separation of a portion from the parent or central mass. This fragment assumed its place in the whole system, collected smaller particles to itself, and thus grew over a long period of time into one of the several present planets. Both theories, as may be seen, stress a primary *undifferentiated* mass of vast spatial limits which, under unknown conditions, became more differentiated; that is, separated into a number of smaller sections. Spectroscopic studies of the composition of the parent stock and such cosmic offspring lend further credence to the theory that at one time all the material found in the solar system constituted a homogeneous *undifferentiated* mass.

Chemistry and Physics. We find the doctrine of evolution holding in the fields of chemistry and physics. If we start, for example, with the atom, we are told that many unlike but related forms exist. The distinction among atoms is drawn in terms of make-up or structure. The simplest form is today represented by the hydrogen atom. It is assumed to have one large central "sun"—the proton, and one smaller satellite—the electron. According to this way of theorizing, elements may, within limits, be transmuted or changed into other elements. Hydrogen, *e.g.*, may be changed into helium. Again, hydrogen and helium, under proper conditions, may actually produce other atomic structures. Additional credence is given to such a developmental hypothesis by the facts that the atoms of some of the elements, *e.g.*, uranium, appear to break down, emitting rays—*alpha*, *beta*, and *gamma*, the last very closely related to, if not identical with, *X*-rays—thus forming other elements. Uranium may, for instance, pass through successive stages, among which we may number radium, and end in the form of ordinary lead. The *alpha* rays emitted under decomposition or disintegration, upon passing into solid objects, for instance, aluminum, may lose some of their properties (electrical) and become helium. In this astounding manner we have right "before our eyes" the transmutation of elements or the "creation" of one element from another. Thus we see that in some cases at least the so-called indestructible atom

of the older theory of matter is transmutable or capable of evolving into something else.

ORGANIC EVOLUTION

Evidence of Blood Relation. In biology, the doctrine of evolution may be roughly expressed in terms of the concept of "blood" relation, where this is taken to mean that all life is related and continuous. Life comes from life, and there are, and can be, no gaps and no discontinuities. In other words, there is no spontaneous generation of life from inorganic matter. All creatures are blood brothers, or, if one prefers, distant cousins. Contemporary forms, according to this way of thinking, have antecedents among the earlier and now wholly extinct forms of life. These, in turn, go back to still earlier origins and so on. The present day animals stand at the end of a series of divergent lines of development, each of which traced back leads gradually nearer and nearer to other lines until all pass into a common stock. The picture may be drawn in terms of a tree with many branches, which lies so buried that only the tips of the top shoots are visible at the surface of the earth. Superficially regarded, each tip or shoot is distinct and unrelated; but if we expose the tree, we find that each tip is connected with branches which, joining larger branches, finally merge in the parent trunk. All parts, it is assumed, are related. In some cases the relation can be shown beyond reasonable doubt; in many other cases, however, the relation must be inferred or merely guessed at. The evidence for this relationship assumes many forms. We must dwell for a moment upon certain of these forms.

Paleontology. For evidence, the biological evolutionist seeks far below the earth's surface. He attempts to study the geological distribution of those forms of organic life (which are assumed to have existed in those far-distant ages when the earth was much younger) the fragmentary remains of which, in many cases, lie deeply imbedded in the earth's crust. He turns to those manifold fossilized records and reads—shall we say—between the bones. Thus, the paleontologist maintains, from his examination of the meager remains of these earlier animals, that they tell an interesting story of life as it once existed in those distant ages. He finds, for instance, that the simpler, more undifferentiated and unspecialized forms of animals appear in the lower strata, while the more complex, more differentiated and more specialized forms are found in the upper strata. Moreover, the strata which are near each other show fossilized forms very nearly alike. But those strata which are more remote from each other show forms which are less alike.

Again, the nearer one approaches the earth's surface (where the strata are undisturbed) the greater is the degree of similarity observable between fossilized and contemporary forms. From such evidence, it is argued that there must be some *causal* relation existing between the earlier and later forms of animal life, where earlier and later time is shown by the order of rock stratification.

Geographic Distribution. We may consider the earth's crust *horizontally* instead of *vertically*; that is, we may study geographic instead of geologic distribution. Here the more widely or the more rigidly the various forms of organic life are separated, the greater is the degree of dissimilarity prevailing among *representatives of the same family group*, either plant or animal. A striking illustration of the assumed effects of geographic distribution upon organic forms is to be found among the plants and animals inhabiting the Galapagos Islands. Here, *e.g.*, ten distinct kinds of tortoises have been reported from as many different islands. Each island appears to possess its own particular brand of tortoise. On one of the larger islands, five distinct kinds of tortoises are found to exist in five different portions of the island. The more remote islands show the more unlike forms, yet all manifest a noticeable relationship to the members of like species on the adjacent American continent.

Galapagos. Darwin visited these islands during his long sea voyage on the *Beagle*. He has given us a detailed account of life as he found it there. At the time of his visit this region had not suffered the degree of spoilation now found. We quote briefly from Darwin's description.

> Most of the organic productions are aboriginal creations, found nowhere else; there is even a difference between the inhabitants of the different islands; yet all show a marked relationship with those of America, though separated from that continent by an open space of ocean, between five hundred and six hundred miles in width. The archipelago is a little world within itself, or rather, a satellite attached to America, whence it has derived a few stray colonists, and has received the general character of its indigenous productions. Considering the small size of these islands, we feel the more astonished at the number of their aboriginal beings, and at their confined range. Seeing every height crowned with its crater, and the boundaries of most of the lava-streams still distinct, we are led to believe that within a period, geologically recent, the unbroken ocean was here spread out. Hence, both in space and time, we seem to be brought somewhat near to that great fact—the mystery of mysteries—the first appearance of new beings on this earth (*12*, 377).

Beebe, who has also studied this region, believes that these islands were at one time connected by a land bridge with Central America.

This bridge was swallowed up by the sea. Since then the life thus isolated has developed into distinctly different forms from those found on the continent. This holds true not only of the large tortoises but for insects, birds, crustacea, and the like. It would seem that here on these islands we have striking evidence pointing towards the truth of the claim that geographic isolation by water, mountain range, forest, or desert barrier, together with unlike temperature, climatic, altitudinal, and food conditions, serves to produce unlike forms of life. The evidence, broadly viewed, leads one to the conviction that differentiated though the forms of adjacent regions may appear, yet they truly represent developmental shoots from the common stock. In geographic distribution, we are told, the *nearest* related species is not very likely to be found either occupying the *same* region, because it would be swamped by the parent stock, or living in a very *remote* region. It is usually found in a neighboring region, separated by some barrier.

Embryology and Morphology. Some of the most striking forms of evidence pointing toward existence of a high degree of relationship among various animal groups come from embryology. We are told that during the course of embryological development an individual of a higher form appears roughly to pass through various stages. Of these, some, at least, seem to be quite similar to the embryos of the lower forms or to those forms which are alleged to be its ancestors. Take the case of man. Starting as an egg, in the short time of three months, he shows (in the blastula stage) a condition approximating colonial life[1], he then sports gill slits, later he resembles a monkey, or a pig, or a cat, and he finally ends by being a man. Moreover, in common with the huge apes, he carries to his grave the remnants of a tail, which is clearly observable in his early prenatal life. It is as if man, as an embryo, started to be many things and finally became man. Ontogenetically considered, man in this way recapitulates phylogeny. As further evidence of this general biological relationship we find in adult man, numerous organs and *structures* which apparently exhibit no present utility. They are, we say, vestigial and functionless. We likewise find *functions* which apparently possess no value. We know, for instance, that the newborn babe, a few seconds of age, is able to suspend itself from a bar placed in its hands and swing there—with its legs drawn up against its side and with its feet turned inwardly in a truly simian posture. This ability to support itself is peculiar to the early days of infancy

[1] By colonial life we mean the living together of a number of cells, each of which is more or less independent. A common, but not quite exact, illustration is the coral.

and disappears with age. We might again point, as do some, to the apparent satisfaction derived from being rocked as further evidence of survival of old functions. Finally, there is the morphological citation of homologous structures. The arm of man, the foreleg of the horse, the wing of the bird, and the flipper of the whale are, we are told, *structurally* similar. All of the above facts, as well as many others which we are unable to bring forward here, indicate a degree of similarity among the members of the various orders that is interesting, if not biologically significant. The biologist believes them to be significant. He maintains that they all speak in ringing terms of the interrelationship existing among the various branches of the whole animal kingdom.

PSYCHOLOGICAL EVOLUTION

We have sought to show how the doctrine of evolution applies in the fields of astronomy, physics, chemistry, and biology. We turn now to consider the use of the hypothesis in psychology; that is, how evolution proceeds in the realm of the psychological. From biology, we saw that the various animals now inhabiting the earth's surface represent forms of life quite unlike those organic structures whose bony framework and whose bodily impressions are preserved in the rock strata of the earth's crust. Animal forms have unquestionably changed. Have we any reason to suspect that they have also changed psychologically; that is to say, become possessed of different abilities in hearing, seeing, feeling, acting, and the like? We know, beyond doubt, that as we pass from one phylum to another in the scale of life we find striking psychological differences among *contemporary* forms of life. No one possessed of any understanding would expect the same behavior of the ordinary earthworm and of a house cat. They belong, we say, to different orders. They are different in body and in mind. Moreover, we do not expect the same sort of psychological activity from a young and from an old cat. We assume that time has played a part; changes have occurred in the psychological life merely because of a lapse of time. Again, it is definitely assumed that *man* has not always shown his present structural makeup. We believe that there must have been stages represented by earlier forms which were quite different structurally from contemporary man. Have we reason to believe that man changed his bodily, but retained his psychological characteristics? We know, beyond the shadow of a doubt, that the human individual develops psychologically from infancy through childhood and adolescence into maturity. As intelligent persons, therefore, we do not look for the same abilities in the child and in the adult. It is not a matter, we must point out, of

merely having had more experience. It is something quite beyond the mere accretion of experiences. It is a true case of development—evolution—that places the finished adult in our midst at the end of his eventful journey as a wholly different organism from that found in babyhood. The evidence for psychological development, we believe, is perfectly straightforward and unambiguous. Just as we find bodily development, so likewise do we find psychological development. Thus we assume that man, generically regarded, has developed mentally, or psychologically, as well as bodily. The one is not the other. They are related but not identical.

How Evolution Occurs Psychologically. Let us now consider more specifically the application of the doctrine to this field. Instead of grossly referring to where—in what organisms—evolution occurs, let us ask rather concerning the ways in which the process works in the animal, the race or in the individual. If we consider mind in terms of composition, or elemental constitution, we find that there has been an increase in the variety of experiential, or mental qualities. Thus the course of psychological development in the animal series has been marked by the appearance of new qualities. There is no evidence to indicate that micro-organisms exhibit the same qualitative variety as is found, for instance, in the fish or in the mammal. Evolution has unquestionably meant the addition of new sensory qualities—new sensations: visual, auditory, and the like. The process has been characterized, furthermore, by the appearance of an entirely *new* class of components; *viz.*, the images which play such a very important rôle in the psychological life of man. Moreover, in addition to the qualitative variety, it would appear that quantitative contributions have been made. New intensive, spatial, and temporal features of experience have undoubtedly appeared during the course of development. The organization of mind, moreover, shows changes with time. We do not go to the child for the complex patterns such as we find in the adult. We say that the mind of the child—its experiential patterning—is not so highly organized. The *Gestalt* psychologist has sought to show that when we consider them as they occur in organisms at unlike levels of life, or within the same individual upon successive occasions, the many experiential patterns exhibit striking differences. Some are quite simple; others are quite complex. Evolution has sometimes been referred to as growth from the simple to the complex. This is strikingly true of the organized patterns of experience.

The Evolution of Bodily Mechanisms. If we consider the development of the bodily side of the psychological organism, as represented

in the gradations of the phylogenetic scale, we find that there has been a gradual increase in the number of receptor organs. Moreover, there has been a clean-cut differentiation among the receptor organs in terms of the sort of stimuli to which the organism is sensitive. It is, as if, with development, more and more doors have been opened, or doors of many unlike shapes have been added to the organism thus admitting more energy of the same or of different sorts. There have likewise been very striking changes in the central nervous system. In the lower organisms we find quite simple neural structures; in the higher forms, very elaborate structures. The most superficial comparison of the cerebrum of the fish, the bird, and the ape shows the truth of this statement. The course of evolution has been signalized, as we can see, by the production of bigger and better brains. Finally, we find significant changes in the effector organs. The muscles and muscular systems of the higher forms of life permit of a greater variety of actions than do those of the lower forms. The development of the muscles has roughly kept pace, we are told, with the evolution of the receptor organs and the central structures.

How Does the Behaviorist View Evolution? The behaviorist points out, from his side, that genetic studies show striking changes in the stimulus and response relations. He shows that whether we go up the zoölogical scale of life, consider the development of the race, or view the growth of the individual from infancy onward, we find the organism, human or animal, responding to a steadily increasing number of stimuli. More and more, the unlike phases of the world playing upon the individual become effective for behavior. At the same time the individual is establishing more complicated and elaborate patterns of response. The more developed organisms are able to perform a great many actions, one after the other, in a highly coördinated manner. We find a much greater degree of control and accuracy of behavior in the adult than in the child. We discover that development brings greater ability to carry through sustained behavior patterns. Finally, we are told that there is, with development, a decided increase in the variety and number of new responses to the same stimulus. Evolution adds both on the side of the stimulus and on the side of the response. Under development the individual exhibits a much wider repertory. He is, in short, more versatile in his behavior.

The Evolution of Psychological Functions. Along with the development of receptor organs, central nervous system, psychological qualities, and experiential patterns has gone a corresponding development of the psychological functions or activities. Animals low in the phy-

logenetic scale cannot possibly perceive as do animals at higher levels. Studies of spatial perception, for example, clearly show outstanding differences at the various life levels. Children, moreover, do not perceive as do adults. Again, we do not expect a little child to remember or to imagine in a way equal to the adult. Neither do we hold the child "responsible" for many of its actions, because, we say, it cannot think, or it is unable to differentiate between right and wrong conduct. We must unquestionably recognize that children develop functionally, and that their development shows striking changes from time to time. New functions appear with increased age. Old functions gradually extend their range. And always an increase in precision and refinement is to be seen under development, both in the individual and in the phylogenetic series.

Where Psychological Evolution Occurs. It should be evident, by now, that there are three major fields in which psychological evolution occurs and from which the genetic psychologist consequently draws the materials for his discussion of mental development. He can go to the animal series to seek out the various psychological abilities of the animal at unlike levels of development. He can compare the mollusc, for example, with the arthropod; the rat with the dog, and so derive a comparative description of their similarities and differences. He can build up from the material gathered in this manner a scale of the psychological stages in evolution. He can take any one function; *e.g.*, perception, and seek to follow it through from one level to the next and so discover where each animal group stands in the whole series. Or he can take various behavior patterns, experiential wholes and simple mental qualities and treat them similarly.

He can consider the individual from infancy to senescence. He can seek out its sensory and motor equipment, its various functional abilities at birth and then carry each or all of these through the years of the individual's development. In this way he can secure a long-time picture of the human individual's development. Moreover, if the child exhibits during the early years of its growth, as some maintain, certain peculiarities characteristic of earlier racial development, he may actually add to the knowledge of racial growth by his study of the child.

Furthermore, he can go in his search for racial history to the evidence made available by way of structural remains of man and consider them for what information of a functional nature they may give him. He can go to the products of man, both physical and psychological, for what they offer. He can thus consider the early and primitive tools, weapons of the chase and warfare, and all such simple products of Man's labor

and skill. He can turn to the customs, habits, beliefs, drawings, language, and the like for the significance which they possess for this problem of racial development. All such products throw light upon the functional abilities and attainments of primitive man.

We shall later come to a more detailed consideration of the problems of psychological development as it occurs in each of these fields. We can give no more time to it now. In order to complete our hasty survey of the more outstanding aspects of the general problems of evolution we must consider two additional topics. The one has to do with the factors which serve to direct the course of evolution and the other with one of the most interesting aspects of one's history; *viz.*, the mechanisms of inheritance together with their products. This latter is the problem of the biological conditions which serve to determine the structural and functional characteristics of the individual organism. In terms of evolution, it is that one single factor without which there would be no propagation of individuals, no continuance of the species, no variation—in short, nothing upon which the selective forces of evolution might work.

DIRECTIVE FACTORS IN ORGANIC EVOLUTION

Isolation. We spoke of the production of unlike forms of organic life, both floral and faunal, under isolation through the operation of geographic barriers. In isolation, we find one of the outstanding auxiliary agents responsible for the production, or the development, of new line of animals. Where some slight difference in structure or function, biological or psychological, exists through variation, isolation permits the organism so segregated to propagate, and so to perpetuate this particular characteristic. Under such conditions, the animals can breed pure without danger of having this characteristic swamped by other closely related forms. Of course, we recognize that the isolation need not necessarily be geographic; that is, it need not involve some natural barrier. For we know that man constantly isolates his plant and animal stocks: his corn and wheat, his cattle and sheep and thus enhances some particular and desired trait. In this way, as we know, man has brought his domesticated products to a very high level. His horses are bigger or faster; his cows produce more milk or butter fat; his corn weighs more per acre; and his wheat is more resistant to fungus attacks. All this is done, we say, through artificial isolation.

The Transmission of Acquired Traits. A second agent, alleged to be at work, in advancing and directing the course of evolution assumes the form of the transmission of acquired traits. This particular doctrine

was most ardently advocated by Lamarck. He maintained that the use of an organ or structure strengthens it. In time the induced modification becomes incorporated into the lineage and so eventuates in some new form of life, with new structures or functions. On the other hand, disuse results in atrophy and functional impairment and terminates eventually in complete loss of structure and function. Weismann maintained, on the contrary, that this cannot be true; that, in fact, changes produced in the parent body have no hereditary effect upon offspring. Any heritable variation must be intrinsically determined; that is, determined within the germ plasm. Weismann, as evidence of his claim, cited the fact that successive generations of de-tailed mice showed no reduction in tail length. Castle, who agrees with Weismann, transplanted the ovaries from a *black* guinea pig into the body of an *albino* guinea pig. The latter was then mated with a white guinea pig. All the offspring were black. It is assumed, since such a tremendous change as this induced no perceptible change in the characteristics of the offspring, that all modifications, in order to be effective, must be modifications in the reproductive cells themselves.

Consciousness. Another factor operative in producing changes in the course and direction of evolution is psychological in character. Mind or consciousness, according to this way of thinking, has played a very significant part in determining the evolutionary order. Of the many whose names could be cited as holding to this position, we shall cite only two. For his presidential address before the *American Psychological Association* in 1909, Judd chose the topic of *Evolution and Consciousness.* In Judd's opinion there was at that time no subject of "more vital importance to the psychologist than the problem of determining the relation of consciousness to the general process of organic evolution." According to Judd, consciousness functions to establish more harmonious relations with the environment by "taking the environment into the individnal and there working it over and over until it assumes a form in which the environment may be used to the advantage of the individual. Consciousness gives to the individual a supremacy over external conditions which none of his other functions ever permitted. It continues and carries to a higher level the process of differentiation of the individual from his environment which has been going on throughout all organic evolution" (p. 84). We have much the same idea expressed by Herrick, an outstanding neurologist.

Herrick, who would be classed in psychology as a functionalist, assumes that mind as a function of certain of the higher neural centers is truly a product and a directive factor of evolution. "The mental

processes and their organs," he tells us, "like the muscular and conducting processes, have grown up in individual and racial development gradually and naturally" (*21*, 292). But mind just as truly possesses great possibilities as a directive agent. He points out first with regard to the general tendency in some quarters to deny the existence of consciousness that "the neglect of this factor in the human behavior complex, so far from simplifying the problem, only further befogs the issue, as do also the ingenious devices invoked to explain away that awareness which nevertheless always intrudes, however unwelcome." He then goes on to tell us, "Mind as cause is, in fact, the most significant of all the progressive factors in evolution; it has come to full expression in consciously fabricated purposes and ideals only within the (relatively) few thousand years that mankind has occupied the earth" (*21*, 357). It would seem, according to the above way of thinking, that mind has played an important part in determining the course of evolution. It would mean that during the course of evolution those individuals who varied by way of the possession of more mind, or of a new variety of mental process had an advantage over the less fortunate organisms. The former individuals were able to survive; the latter did not. Mind thus stood as a directive factor in development.

Another and final explanation of the way in which the evolutionary forces or agents proceed about their business was formulated by Darwin. Darwin's contribution to this problem involves several major assumptions, which may be simply indicated by such terms as *over-production, chance variation, struggle for existence, survival of fittest, and propagation of advantageous variation.* All might be easily summed up under the primary head of *selection.* The selection may be natural; it may be artificial; or it may be sexual. Of the three, the first is probably most important. Darwin seemed so to regard it. We shall consider this primary factor alone.

Natural Selection. The theory of Natural Selection assumes, generally speaking, that every individual—particularly animal, but possibly human—is actually engaged in a terrific struggle to gain the necessities of life. It must secure these or perish. Under such conditions the method of natural selection involves first of all the assumption of an overproduction of individuals. More creatures are to be found, Darwin asserted, within the limits of any given habitat than can possibly survive. We know that some animals exhibit great fecundity. An eel may journey thousands of miles down the river to the sea and celebrate her long trip alone—"her mate is out along the ocean mudbanks having a good time"—by producing as many as 15,000,000 eggs. Such a number

is so stupendous that in a short time, if all matured, the seas would be filled with eels. A single bacterium may be responsible for initiating a reproductive orgy that suffering no limitations would result within the short period of twenty-four hours in the production of about 16,000,000 bacteria. Even where such stupendous numbers do not exist, there comes an intense struggle for existence. The individual battles with members of the same species, with individuals of unlike species, and with the inorganic environment. The progress of selection moves ruthlessly on. Organic and inorganic agents (weather, climate, pathogenic organisms, food supply, and so on) work unremittingly to destroy. Capital is made of every possible advantage. Some chance variation possessed by some one individual may turn the balance in its favor. The fit survive; the unfit die. And the story ends with the propagation of the fit and the inheritance of the variation or trait that made survival possible.

This is presumably the trail that man has followed. He has stumbled along it blindly, pushed hither and yon by the forces about him, for variations arise entirely fortuitously and are selected fortuitously. A few are good; the most are bad. The whole process may be summed up in terms of a blind, chance play of many factors that contribute to a *differential* death rate. The causal factors in evolution, in terms of natural selection, reduce then to those particular agencies which produce variations in individuals and those other agencies which favor the elimination of some and the preservation of others. Natural selection is selective survival based on hereditary differences which cause some to live and others to die. It is, in actuality, trial and error on a universal scale. So far no one really knows the factors which produce variations. Until they are discovered, the whole problem remains unsettled. It may be that they are due to peculiar properties inherent in the germinal plasm. Or they may be due to the effects of various extra-organic conditions upon the germinal plasm. The problem is as yet theoretical.

We must turn now to consider the last general problem in connection with the large subject of development. We must examine carefully the mechanism by means of which the race moves on, as some would say, in its "goal-less" journey. The immediate biological means by which it is kept going is heredity. Of the many aspects or phases of the whole problem of development, this is, perhaps, the most important. We have reserved it to the last. We shall consider it under the following heads: (1) the laws of heredity; (2) the methods of studying psychological inheritance; (3) the hereditary basis of sex; (4) heredity and environment; and (5) the problem of the inheritance of acquired traits.

THE LAWS OF HEREDITY

Contributions of Remote and Near Ancestry. The biological forces operative to determine the structures and functions possessed by the human or animal organism at birth or in its more mature stages have a very long history. In the case of man the causal sequence reaches back to those many critical developmental periods when it was determined that he would, for example, possess a backbone, produce young viviparously, live on land, walk on two legs, be physically strong as well as a host of other characteristics. All these, we say, constitute the human individual's heredity. He owes them to the properties of the germplasm of his remote and near ancestry. The effects of remote ancestry appear by way of the many functional and structural similarities which characterize the human being as a mammalian vertebrate of the primate order. Man's structures and functions are quite early cast so as to develop along certain general lines. Thus, there is reason to believe that the human ovum at the very moment of fertilization is racially set to develop into a human organism and not into a horse, a rodent, a bird, or a mollusc.[1] The remote ancestry appears to define the limits of the general pattern and the course of human development. The near ancestry determines largely whether the individual will be blue or brown eyed, light or dark, intellectually keen or dull, and so on. That the human being will have two legs seems largely to be racially determined. Whether the legs are long or short seems, however, to be a matter of more immediate ancestry. That he will have teeth of a certain number and of a given arrangement seems to be racial in determination, but the particular spacing and quality appear to be a matter of immediate parentage. That he acts, thinks, feels as a human organism appears to be largely a matter of race; but the particular degree and variations of each seems to rest more with the immediate antecedent stock. Some characteristics are, then, peculiarly racial; others are

[1] According to Child, "every organism as we know it is a product of evolution and bears in itself the records of its past history, if we could read them aright. Its behavior, as well as its structure depends upon this past history. The organismic mechanisms are characteristic and constant to a high degree for each particular species or kind of organism because of this history. Different kinds of organisms arise from different kinds of protoplasm and each such protoplasm must possess a specific constitution handed down from the past, *i.e.*, hereditary. Whatever the rôle of environmental factors in determining the characteristics of an individual organism, there can of course be no doubt that the organismic mechanisms arise on the basis of the hereditary substratum and that this determines that the organism shall be a certain species or variety of fern, elm, snail, fish or ape. *From this viewpoint the problem of behavior involves the whole problem of evolution as well as that of inheritance*" (*6*, 4, Italics ours.)

recognizably familial, and some, under variation, are apparently individualistic. We must now consider briefly the essential nature of the biological mechanism by means of which the physical and psychological make-up of the human individual are hereditarily determined.

The Physical Basis of Heredity. The occasion marking the "first" stage (perhaps we should remark in passing that there really is no true first in inheritance) in the life history of a human organism is the fertilization of an ovum (egg) by a sperm cell. These two cells—ovum and sperm—are to be considered as the immediate physical basis of human heredity. Each represents the direct product of the activity of specialized glandular material. This material is to be distinguished both structurally and functionally from bodily or somatic material. During the early stages of cell-division it is apparently set aside as a small bit of the original germ plasm (the egg) to develop into structures possessing unique functions. Just as certain material of the body functions in respiration, in excretion, in digestion, so the reproductive material, early isolated from the vegetative materials, functions, when mature, to produce the sex cells upon which the race constantly draws for its continuance. It is a striking fact that in a literal sense the very existence of all of the thousands upon thousands of individuals who follow down the years in successive generations goes back causally to microscopic bits of glandular product; namely, an egg and a sperm.

The egg (or sperm) holding as it does the very future of the race is inexpressibly important—if one can speak of one part of a whole process as being important without implying that other parts are not. It constitutes a highly tenuous bridge over which the ceaseless flow of generations passes. It is the true biological link between successive generations of human organisms. One of these minute germ cells consists, for purposes of our present discussion, of three "parts." There is a central mass, the nucleus, composed chiefly, we learn, of chromatin; there is a centrosome, a much smaller glandular structure than the nucleus; and there is the cytoplasm, which constitutes the major portion of the total structure of the cell. Each makes its own contribution to the process of conditioning a new human organism. But it is the chromatin, organized into chromosomes, we find, that apparently serves as the immediate agent of transmission, or as the real vehicle of human inheritance. Within the make-up of the chromatin lie the potentialities which, given expression, may develop, on the one hand, into an individual of brilliant intellect and commanding personality; or, on the other, into a drooling idiot, more helpless than an animal. The other two parts of the cell are necessary accessories.

Cell Division. Figure 4 shows cell division. Considered in their sequence, the diagrams illustrate roughly the nature of the outstanding changes which one might observe if one were to watch a cell for a short time during its reproductive moments. A shows the nucleus, the centrosomes, and the cytoplasm. In B, the centrosomes have divided and are moving apart to form the poles. In C, the chromatin has broken up, preparatory to migration and the production of pairs of chromosomes. In D, the chromatin has arranged itself in pairs for separation. In E and F, the chromosomes are moving apart, and two new cells are forming. In G, cell division has been completed by the final separation of the cytoplasm of the original cell. There are now two cells instead of one. Further divisions occur to give us the human organism as a finished product. Here we catch a glimpse of the nature of the human being as it embarks upon its ontogenetic journey. How different is the beginning from the "finished" product! Here in these early stages there are no sense organs, nervous system or effectors; no head, arms, or legs; no mouth, stomach, or alimentary canal; no perception, memory, or intelligence, as we know each of these in its later stages. The attempt to link up the finished human product with this mode of transmission which has nothing "human" about it; or the attempt to read order into the hereditary functions of these tiny cellular structures has indeed challenged the highest abilities of many able men.

The Study of Inheritance through Product. In the study of inheritance it should be recognized that we cannot possibly go to the germ plasm and study it with the expectation of directly observing the actual processes of heredity; for there we should find only chemical compounds—not the actual mode of inheritance. The isolation and experimental observation of the egg do not reveal the process of inheritance. Inheritance is unquestionably a function involving the simultaneous operation of many conditions. Our study of inheritance, as a function, must constantly involve the results of the process—that is, the product. We can go to the products of inheritance and from what they show draw inferences concerning the actual processes which go on in the basic material. All methods of studying inheritance, whether statistical or experimental, must look constantly to the product as being of great significance. It is the old story of process and product. The proof of the process lies in the product; but, as we should expect, the product may be approached from different angles. Some investigators have accordingly sought to study the mechanism of inheritance by considering the degree of similarity and difference in one or more traits as found in large groups of individuals just as they occur in the general

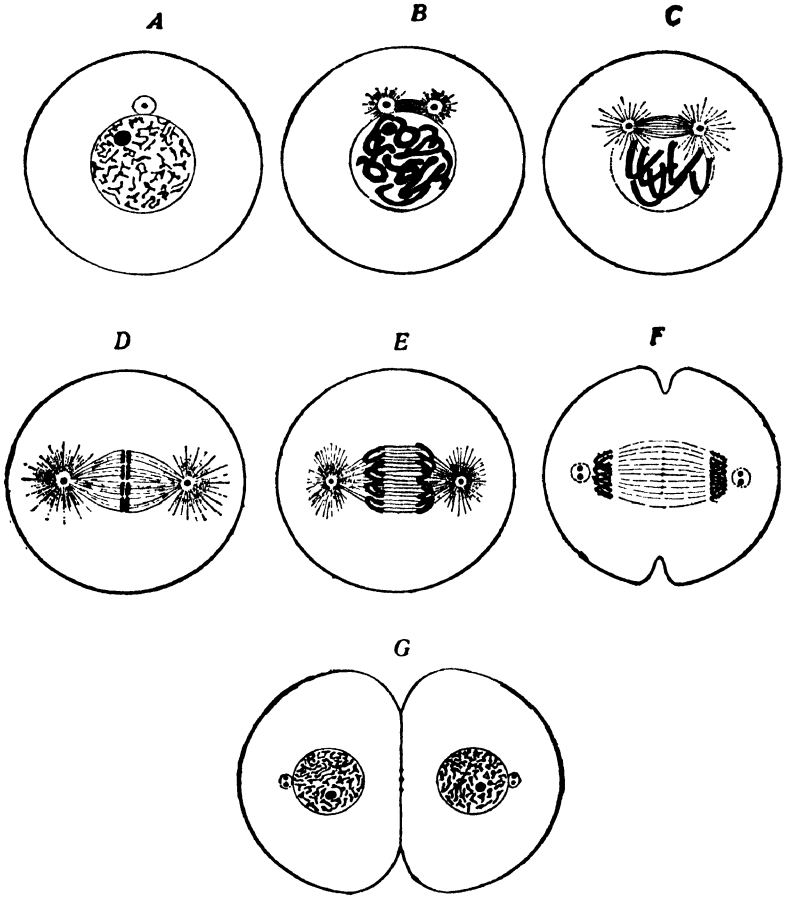


FIG. 4. Diagram of successive stages of mitotic cell division. *A*, resting cell with centrosomes lying near the nucleus; *B*, the chromatin of the nucleus is in the form of chromosomes, and the centrosomes have divided and are surrounded by short astral rays and are connected by spindle fibers; *C* shows a larger spindle; the nuclear membrane is breaking down and each of the chromosomes shows a longitudinal split. In *D* the nuclear membrane has disappeared, the chromosomes are arranged around the central part of the spindle. *E* shows the halves of the split chromosomes being drawn apart toward the poles of the spindle. In *F* the chromosomes, which are pulled still farther apart, begin to show an irregular outline, and the cytoplasm is being constricted into two parts. *G*, the end stage, in which cell division is complete and the nucleus of each daughter cell is in the resting stage. The centrosomes have divided in preparation for the next cell division. From S. J. Holmes, *Life and Evolution*. By permission of Harcourt, Brace and Company.

population. Others have sought to compare pairs of individuals—for example, parent and offspring, or brother and sister, or cousins—to determine degrees of likenesses and differences. Others have sought to breed (cross) particular strains, types, or kinds of animals and then look to the product (quality and quantity) of each sort for information about the mode of inheritance. Others have sought to derive an understanding of the mechanism of inheritance by a microscopic examination of structural changes in the basic materials together with a knowledge of the subsequent product. At all times, the results obtained from experimental work with the animal are assumed to hold equally well for the human being. We turn now to review briefly the nature and results of these statistical and experimental methods of studying inheritance.

Galton. A few individuals have clearly been outstanding in terms of their contribution to this interesting problem of the process of hereditary transmission. Among these we must set down, first of all, the name of Galton. Galton and those who have followed him have contributed, we might say, in two ways. They have formulated explanations concerning the ways in which inheritance occurs, and in some cases they have pointed the way to the scientific study of inheritance. Galton, who is considered by some to be the founder of the scientific study of inheritance, sought to investigate the problem of hereditary transmission by the use of statistical or quantitative methods in connection with large selected and unselected groups of the adult human population. It is of particular interest to the student of psychology to know that the first serious studies of inheritance were done from a psychological standpoint and with psychological material. For Galton was particularly interested in the inheritance of psychological capacities, tendencies, or traits. His work, *Hereditary Genius*, for example, has commanded attention as a classic in this field.

Law of Ancestral Inheritance. As one form of result from his investigations, Galton formulated two laws which are based upon relatively large numbers of cases. The first of these is known as the *Law of Ancestral Inheritance.* In terms of this generalization, the individual derives, on the average, one-half (0.5) of his total heritage from his parents; one-fourth $[(0.5)^2]$ from his four grandparents; one-eighth $[(0.5)^3]$ from his great grandparents and so on. Figure 5 shows diagrammatically the relative amount of assumed contribution from each parent, grandparent and great grandparent, according to this law. The degree of contribution gradually declines, we can see, as we pass back through the ancestral ranks. Each ancestor, according to this law,

is supposed to contribute a certain fraction of the total inheritance. But the evidence at hand actually indicates that each of our many forebears does not affect us to the same degree as do certain others. Some have made outstanding contributions; others less. And many have apparently not contributed at all—although we have unquestionably descended directly from them. We might use a crude analogy and say that the latest offspring is a common carrier in which, theoretically, all

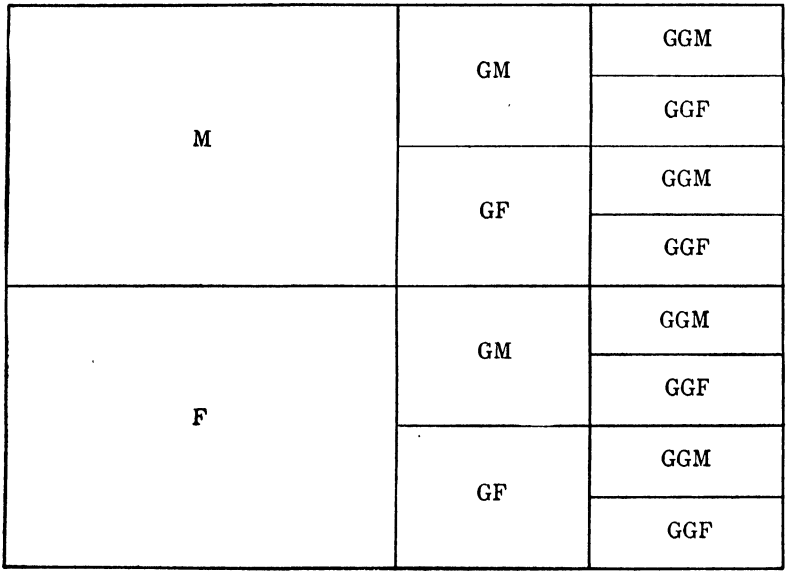


FIG. 5. This diagram represents the assumed hereditary contribution of parents, grandparents and great grandparents in terms of Galton's *Law of Ancestral Inheritance.*

his ancestors are borne around. But the many ancestors which every human being must necessarily number in his family tree cannot possibly be crowded into the same vehicle. We must recognize, then, that as some get in, others must of necessity get out, for the vehicle has its limitations. Since this differential contribution is generally admitted, it becomes impossible to accept without qualification this law of *Ancestral Inheritance.*

The Law of Filial Regression. The second of Galton's generalizations is that of *Filial Regression.* According to this law the offspring of parents who vary from the general average, or *mean,* of the total population in any given trait, vary similarly, but less than do the parents. This law states a tendency, purely fortuitous in character, whereby the race or group maintains itself around a norm or average. The stature,

for example, of adult offspring of very tall or of very short parents must on the whole be more mediocre than the stature of the parents; that is to say, more near to the mean of the general population. According to Pearson:

> Fathers of a given height have not sons all of a given height, but an array of sons of a mean height different from that of the father and nearer to the mean height of sons in general. Thus take fathers of stature 72 inches, the mean height of their sons is 70.8 inches, or we have *regression* towards the mean of the general population. On the other hand, fathers with a mean height of 66 inches give a group of sons of mean height 68.3 inches, or they have *progressed* towards the mean of the general population of sons. The father with a great excess of that character contributes sons with an excess, but a less excess of it; the father with a great defect of the character contributes sons with a defect, but less defect of it. The general result is a sensible stability of type and variation from generation to generation (*35*, 454).

This generalization means that average parents tend to produce average children; while subnormal parents tend to produce subnormal children; and finally, parents above the general average tend to produce superior children. In general, the law states that parents who exhibit either extreme, a great deal or very little, of any given trait tend to produce children who exhibit the same trait, but to a lesser degree. The principle of regression finds confirmation from many sources. For example, there is the evidence, derived from some studies conducted by Hollingworth and Cobb, which shows that brothers and sisters of very superior children tend to regress toward the norm of the general population, although they remain above the level of the norm. Thus, the average intelligence quotient of a group of very bright children was 155, while the average intelligence quotient of brothers and sisters was 129, or 29 points above the norm. It all means that nature shows her extreme moments; but, as a rule, she is quite normal. Galton's laws of inheritance, useful as they may be in some respects, are of little aid to us when we inquire concerning the degree of probability that a *certain specific character* found in the parent will likewise appear in the offspring. They do not tell us much about the probability of individual cases. This type of information we owe largely to the work of Mendel and others. We must face in that direction.

At the beginning of the present century, each of three biologists, DeVries, Correns, and Tschermak, arrived independently at a principle of heredity which, unknown to them, had earlier been formulated by Mendel, an Austrian monk. Mendel framed his law from quantitative results derived by counting the number of offspring in successive generations of ordinary garden peas, each of which possessed the *one* or the

other of two distinct characters which had been experimentally crossed (bred). Here was a way, Mendel showed, of giving a *quantitative statement to the probability of some one character* showing up in subsequent generations. This is a very important law of heredity; we must give a few words to it.

Mendel's Law. There are, we find, three primary features to the Mendelian mode of inheritance as it generally stands today. The first of these is the principle of *Unit Traits*. In terms of this particular assumption, each simple, heritable feature observable in the adult offspring is attributable to the presence of a hypothetical unit character (or characters) present in the germ cell. These minute germinal structures (or determiners) are assumed to be fairly independent and indivisible. Moreover they are inherited, as a whole, according to an "all or none" principle. The body of an adult individual is assumed to be constituted of a great number of more or less independent features grouped together to form the whole pattern.[1] The germinal carriers, or agents, directly responsible for these manifold characters may be combined and recombined in an almost infinite number of ways, thus providing for diversification in progeny.

This law assumes, moreover, that many of these unit traits are incompatible. Where two such contrasting characters exist in the parent stock, we find only one manifested in the offspring. The other member of the pair may remain dormant in the germ plasm. Here, briefly, is the *Principle of Dominance*. The *one* of two simple paired characters which becomes manifested in the body is known as the dominant, while the one held back is called the recessive character. The offspring may resemble the one parent in a particular trait, but it cannot be like both parents in the same trait (if the traits are incompatible). Where two traits, dominant and recessive, exist, the dominant is stamped upon the

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[1] But it should be pointed out that such assumed independence is highly questionable. Some students maintain that every adult character is very complex in determination. Thus, a given feature; *e.g.*, color of eye of a fruit fly, is to be attributed not to a single germinal factor but instead to the operation of a score or more factors. It seems scarcely plausible from the evidence at hand that a very precise correspondence between such germinal units and bodily character can possibly exist. According to Morgan, "There is abundant evidence at the present time to prove that the germinal units or genes may and generally do affect more than one of the characters of the individual, and that these effects are present whenever a specific gene is present. . . . The idea that each character is the product of a single gene is in a sense correct, but only in so far as the presence of a particular gene is determinative for a given character. The genes are only differentials. But the same gene may affect many other characters; in fact, it might be said that a change in a pair of genes (or in one only if it is dominant) might affect every single character of the individual."

offspring. At times, so it is maintained, the recessive may actually become dominant and the dominant, recessive. Under extreme changes in environmental conditions such reversal, it would seem, may be induced.

Finally, there is the *Principle of Segregation.* This principle holds that unit factors always retain their individuality. They may be recessive, or in some cases they may, perhaps, drop out. But given the proper condition for expression, any trait, dominant or recessive, will

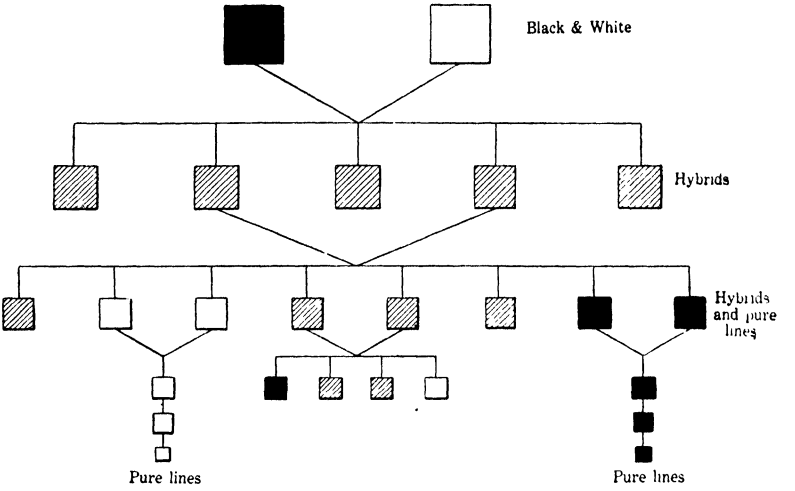


FIG. 6. The theoretical results of crossing pure black and pure white strains. In the first generation, the progeny are all black. In the second generation, some are black and some are white. Of the black, some are pure; others are hybrids, as in the first generation.

be found to breed pure; that is, during many possible crossings it does not become changed. We might say that it must be one thing or nothing. Under sufficiently large numbers to permit of the proper operation of the Mendelian mode of inheritance, the principle of segregation so combines the determiners, in case of true contrasting characters, that the ratio of dominant to recessive in the second filial generation, or among the grandchildren, is *three* to *one.* This means that if we were to cross two contrasting characters such as *black* and *white* (each pure), we would secure, in the first generation, all black progeny, where black is dominant and white recessive. Figure 6 is meant to represent diagrammatically the results of crossing two pure strains. If the *black offspring* here are crossed in sufficiently large numbers, the progeny will show three black and one white; or six black and two white, and so on. The white (re-

cessive) animals among such progeny, when crossed, will produce only white animals. The line, we say, is pure. If we breed among the black (dominant) animals, we will find that certain ones will produce only black. Black, we say, is pure. But other black individuals among such progeny will actually produce, when crossed, both black and white individuals. Because the offspring of such crossing show both dominant and recessive traits, we say that the parents are hybrids. That is to say, their germ plasm is ambiguous. It admits of two possibilities; namely, black and white. A number of factors may operate at times to produce apparent changes in the above ratio of three to one; although the Mendelian mode of inheritance may still prevail. But this mode of segregation is, after all, fundamental to Mendelian inheritance, so if it does not hold under such conditions as outlined above the inheritance is not Mendelian.

Mendelian Traits. In human beings, a fairly large number of traits, physical and mental, are said by some to be inherited in Mendelian fashion. A few dominant physical and psychological traits are accordingly set down as follows: dark skin, hair, and eyes; bone deformities of hand and feet; cataract and glaucoma; muscular atrophy; normal nervous system and normal mind. Corresponding to these are such recessive traits as: light skin, hair, and blue eyes; normal fingers and toes; normal eyes and sight; normal muscular function; epilepsy, feeblemindedness, insanity, alcoholism, and chorea.

Color-Blindness. Certain forms of color-blindness and night-blindness appear to be Mendelian and also sex-linked. The factor for the former, it seems, is carried in the germ plasm of the female but appears under certain conditions in both the male and female. That is to say, it is transmitted on the maternal side as a sex-linked trait. Figure 7 shows the transmission of color-blindness under five possible conditions. Let us start with a normal-sighted (but carrier) mother and a color-blind father (II). Here, one-half of both boys and girls will be color-blind, and in addition, the other half of the girls will be carriers. Now assume that this same type of woman produces children by a normal male (III). Here, one half of the boys will be color-blind, and one-half will be normal. One-half of the girls will be normal, and the remaining half will be carriers. Again assume that both parents are color-blind (V). Under such a union all progeny will be color-blind. As a fourth possibility, let us assume that a color-blind woman mates with a normal man (IV). Under such a union all of the males produced will be color-blind, and all of the females will be normal-sighted and carriers. Finally, if a color-blind man mates with a normal woman, all the sons will be

normal, and all daughters will be carriers (I). The diagram, if studied, will make such relations clear.

In addition to blindness of the above sort the secondary sex charac-

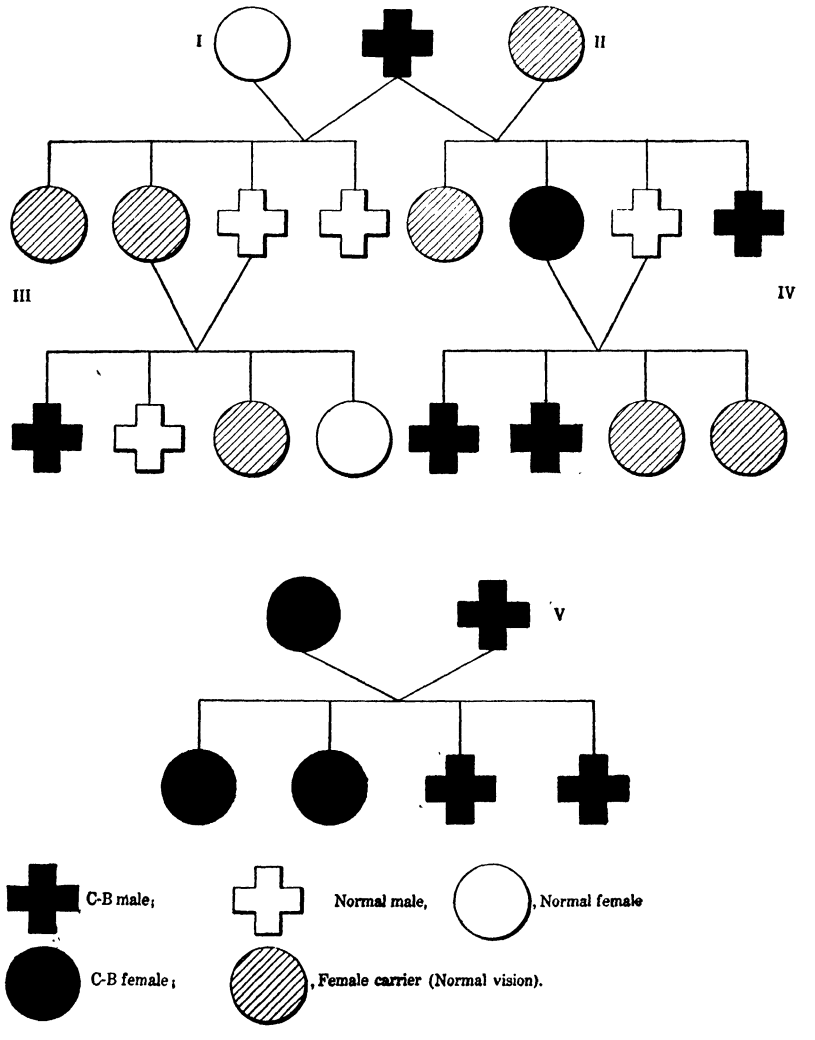


FIG. 7. Transmission of color-blindness. Color-blindness is commonly assumed to be carried, in most cases, as a recessive trait in the germ plasm of the female.

teristics are generally accepted as being sex-linked, although the exact mode of transmission is not clearly understood. Again, some would say, that many, if not all of such characteristics as musical ability, lit-

erary ability, congenital deafness, epilepsy, great mental ability, and the like in their simplest forms are Mendelian in character. Others would maintain that while they are unquestionably inherited, the mode is not Mendelian. Whether we accept or reject the Mendelian mode of inheritance in the human being, we can still unquestionably say that, in terms of heredity, an individual in the true sense of the word is significantly more than he seems. Thus an individual may have dark hair and eyes, be tall, and have a sound mind; yet he may carry in his germplasm the possibility of producing light-haired and blue-eyed, short, feeble-minded children. To the student interested in the improvement of stock, human or animal, the hidden part is of vital importance. A knowledge of the degree of likelihood of the hidden making itself known is unquestionably of great value. It would appear, at least in certain traits, that something like the definite ratio found in Mendelian inheritance seems to prevail in the human stock.

Are Psychological Functions Inherited? We clearly recognize that the human organism inherits many of its psychological as well as its structural features. That is to say, the mental side of the individual is, to some extent, hereditarily determined. Strictly speaking, we know that one does not actually inherit his anatomical structures. We say, rather, that these are hereditarily determined. A man does not inherit his stomach. It is, we point out, *determined* by heredity. He does not inherit his digestion, but it is hereditarily determined. One does not inherit psychological functions or psychological abilities as such, but they are, nevertheless, hereditarily determined to a certain degree. No one could possibly maintain after an examination of the mass of evidence at hand bearing upon inheritance, that only the bodily side of the human organism is inherited. What is actually determined is the total organism, which is just as much psychological as biological. It is evident, then, that the psychological abilities are determined in essentially the same manner as the biological. There is one outstanding method of studying psychological inheritance, the results of which tend to show the truth of this statement. This method, originated by Galton and widely and fruitfully employed by Pearson and others, is statistical. It is, of course, not a peculiar property of psychology; for it may be used in the study of any trait, physical as well as mental. We find two major forms of the method as applied to *human inheritance* of a psychological sort. We shall refer briefly to each.

METHODS OF STUDYING PSYCHOLOGICAL INHERITANCE

The Method of Correlation. The first of these methods is the way

of direct correlation.[1] Here an attempt is made to determine the degree of relationship or resemblance between any two or more individuals in terms of any given character or trait. Let us illustrate how this method of correlation works. We can best start by considering some physical trait such as height, weight, eye color, or hair color. Such characters are easily investigated, and definite correlations can be established. We proceed to determine the degree of correlation found to exist between pairs of related individuals, such as twins, siblings, parent and offspring, grandparent and grandchildren, cousins, and so on, in terms of any one of these traits. Such derived correlations are to be compared with those derived from pairs of unrelated individuals selected at random. It is assumed that unrelated individuals will show zero correlation. If pairs of relatives show a moderate or high degree of correlation, we can argue that either heredity or a common environment has been operative; but since it is assumed that the environment has no appreciable influence upon physical traits, we have, then, correlations which are to be mainly attributed to hereditary factors.

With these correlations of physical characters as the basis, we can pass on to our study of psychological abilities and in a like manner determine the degree of resemblance between the same or other pairs of individuals. If the degree of correlation in the former cases does not differ widely from that found in the latter cases, we have acceptable evidence in support of the claim that psychological inheritance occurs in the human organism in the same way (approximately to the same degree) as physical inheritance. In Table I is set down a number of correlations for both physical and psychological traits. It would appear from these data that one can safely say that the psychological make-up of the human being, in so far as it is represented by these traits, is as much determined as is the physical constitution of the individual.

Some Correlations. Many interesting studies upon this problem of the correlation of psychological abilities of pairs of related individuals have been made. Earlier studies made upon siblings using short and very specific tests such as cancellation, memory, and the like, showed correlations clustering around .3. According to Pintner (35a), "The later studies dealing with what we now call intelligence tests show correlations ranging from .33 to .68. The median correlation of 12 such reports, totalling in all about 5,000 pairs of siblings, is .51. This is what we find for physical traits. The resemblance of twins in intelligence has been studied by many workers. The average of several correlations, totalling in all about 400 pairs of twins, is .78. A few correlations have

[1] This refers to the degree of relationship between phenomena.

been reported for cousins, giving a correlation of about .23." He goes on to remark that if we consider, "these three degrees of relationship, twins, siblings, cousins, we note that the resemblance decreases as the relationship becomes less close, being about .7 for twins, .5 for siblings, and .2 for cousins. For unrelated children our correlation is zero. Although this does not in any sense prove the inheritance of intelligence, it fits in very decidedly with the assumption that intelligence is inherited in exactly the same way as are physical characteristics."

The Historical Method. The other form of this general method of investigating the problem of psychological inheritance consists of a study of families in terms of intelligence, degree of eminence, social and economic status. It is inferred that the existence of a preponderance of certain types of individuals within a single family group is evidence of the inheritance of psychological abilities. Many studies have been made upon family stocks, some inferior and others superior. The results obtained from studies of inferior groups are to be found recorded under the family histories of the "Kallikaks," "Jukes," "Hill Folk," "Pineys," "Hickory Clan," and so on. Some of the superior stocks which have been studied are the Edwards and the Darwin families. Wood's study upon *Heredity in Royalty* and Galton's investigation upon eminent relatives of eminent men may also be cited in this connection. Let us take two of the above-mentioned inferior stocks and briefly consider their family histories.

TABLE I

CORRELATIONS AS INDICES OF HEREDITARY RESEMBLANCE (*23*, 58)

Feature Measured	*Correlation*
Eye color, between brothers (Pearson)	.52
Height, between father and son (Pearson)	.30
Height, between brothers (Pearson)	.50
Cephalic index, between brothers (Pearson)	.49
Color of hair, between brothers (Pearson)	.55
Spelling ability, between brother and sister (Earle)	.50
Estimated morality, between parents and offspring (Woods)	.30
Teachers' estimates of personality traits of school children (siblings) (Pearson)	.50
Arithmetic ability, child and mid-parent (Cobb)	.49
Mental tests, between siblings (Thorndike)	.35
Mental tests, between twins (Thorndike)	.80
Mental tests, between siblings (Starch)	.40
Intelligence quotients of orphan siblings (Gordon)	.53
Intelligence quotients, between siblings (Madsen)	.63
Intelligence quotients, between siblings (Hart)	.45
School records, between cousins (Dexter)	.22
Ability in reading, between siblings (Starch)	.49
Penmanship, between brothers and sisters (Pearson)	.48

The Kallikaks and the Jukes. One of the most outstanding studies of familial histories of this sort is to be found in the records of the Kallikaks as set forth by Goddard. In his study Goddard traces out the character of the progeny resulting from an illegitimate mating between "Martin Kallikak," a soldier of the Revolutionary Army, and a feeble-minded girl. The *immediate* result of this mating was the production of a feeble-minded boy. The more *remote* results include, among others, a long line of 480 descendants, of whom 143 were discovered to be feeble-minded, 46 normal, and the remainder unknown or doubtful. In this family history are to be found the record of 33 sexually immoral individuals, 36 illegitimate children, 24 confirmed alcoholics, epileptics, and so on. Subsequently, "Kallikak" married a normal girl of "good" ancestry. From this union there has come, so far as available records show, a total of 496 individuals. Among these were to be found doctors, lawyers, judges, educators, and authors. Two, it is said, were alcoholic and one sexually immoral. Here are the histories of two lines of descendants from the same common male progenitor. The one seems all "bad"; the other seems all "good." Here is presumptive evidence of the existence of two unlike lines of psychological inheritance initiated in part by two unlike female strains.

Again, consider the Jukes. In the last quarter of the nineteenth century Dugdale made a study of the Jukes family, which up to that time had cost the state of New York, it was estimated, around $1,250,000, for maintenance in work houses, jails, penitentiaries, institutions for the insane, feeble-minded, and the delinquent. Of the 540 individuals who were studied, Dugdale reports that 310 were paupers, many were criminals, including murderers, and approximately 50% of the females were prostitutes. Estabrook, in 1915, carried on the work started by Dugdale. He found, generally speaking, the same sort of thing discovered by Dugdale. Some of this stock had migrated westward without significant effects upon their intellectual fortunes. They were still psychologically pauperized.

Eminent Lines. Now consider the evidence on the other side. In contrast to the records of the Kallikaks and the Jukes stand the achievements of the various members of the Edwards family. The history of the descendants of Jonathan Edwards, an American minister of the Puritan period, revealed in 1900, a total number of 1394 individuals, many of whom have been and are quite outstanding. Among the various occupations of these descendants we cite the following: college presidents (13), physicians (60), army and naval officers (75), many authors, lawyers, judges, senators, a vice-president of the United States, as well as

many others of recognized merit. Here is a striking concentration of psychological wealth, as contrasted with the poverty of the families of the Kallikaks and the Jukes. From Galton's study of 977 individuals with their relatives of the same degree of eminence, we may conclude that an individual who attains eminence is far more likely to have eminent relatives than the person who does not attain eminence. Moreover, the more distantly related a relative is to an eminent man, the less likely he is to become eminent. Galton found there were among the relatives 89 fathers, 114 brothers, 129 sons, 52 grandfathers, 37 grandsons, 53 uncles, and 61 nephews, or a total of 535. Of these, 332 were first degree, and 203 were second degree relatives. Furthermore, not only is there a tendency, according to Galton, for inherited psychological ability to be specialized, but there is also precocity. The individuals who later attain eminence give clear indications of their superior ability quite early in life. Finally, men who are thus gifted rise easily through social and economic barriers; but individuals lacking such gifts, although possessed of large social advantages, cannot achieve eminence.

The evidence appears to be unambiguous. It forces us to recognize that certain groups of individuals comprising a certain stock are inferior, and the inferiority is a heritable familiary trait. At the same time we must recognize that other family stocks are superior. This superiority in turn seems to be a heritable family characteristic. When we come upon figures which tell us that a feeble-minded individual who lived 125 years earlier was partly responsible for at least 480 progeny, many of whom have been clearly inferior, we are brought sharply face to face with the vital problem of the future of the race. We shall have occasion to refer later to this problem. We now pass to the consideration of two problems about which much has been written and which constitute a very fertile topic for purposes of discussion. We refer to the problems of the determination of sex and the influence of environment upon the development of the individual.

THE HEREDITARY BASIS OF SEX

Sex is a very important factor, both in the biological and psychological lives of human and animal organisms. We recognize the tremendous significance of the secondary sex characteristics in the life of the adult male and female animal. In terms of organic evolution such factors have supposedly served as the primary basis of the process of sexual selection. The female, for example, is supposed to make her choice of a mate in terms of the secondary sex traits shown by the male. The rôle of sexual selection has been made clear by Darwin. In terms

of survival these characters must possess utility; if not, they disappear. We know that the appearance of the secondary traits rests upon the normal functioning of the sex glands. The early removal of such tissues from the male and the female results either in disappearance or in the non-appearance of the more superficial differences normally found between the sexes. Ovariectomy in the chicken results, for instance, in the production of a creature approximating the male of the species in length of spur, color of plumage, size of comb, type of crow. Castration results in the failure of the male to develop such normal characteristics as brighter plumage, larger comb, or longer spurs.

The Psychological Significance of Secondary Sex Traits. But if these secondary sex characteristics have great biological importance, we may safely say that they have even greater psychological significance. Literature is replete with the troubles of the "masculine" girl or the "effeminate" man. The male individual possessed of a shrill voice, a scanty beard, or an effeminate figure may suffer the torments of the condemned. The girl with the angular bodily build or the facial contour of the male may develop an unwholesome attitude toward the members of both sexes. In either sex, any decided variation from the mode in the secondary traits unless faced in an intelligent manner, may easily eventuate in a terrific conflict of a social nature with the possibility of developing socially undesirable behavior.

One has but to observe the adolescent at the period when the secondary sex characteristics clearly appear to glimpse the significant psychological changes which they very probably entail. The changes in voice so conspicuous by their ups and downs frequently bring great embarrassment and humiliation. Youth at this period tends to stumble, stutter, and stammer. The boy becomes proud and at the same time ashamed of the facial down; the girl, partly at least because of the fairly rapid increased development of breasts and hips, experiences new responsibilities. She assumes, considerably earlier than the boy of her own chronological age, the apparel and the mental attitude of the adult. Within a year or two at this critical period, as is true in the case of many girls who mature rapidly, she changes from a mere girl to a potential wife. The psychological changes conditioned through this development of sex are enormous.

What Determines Sex? Now what determines whether one shall be male or female? Are there ascertainable factors which operate in some definite manner to determine whether an anticipated individual will be a boy rather than a girl? If there are such factors, are they at all controllable, or do they follow in their operation the laws of chance

distribution? Or again, we might ask why, in the general population, there are more boys born than girls? These are interesting problems. But they are knotty. They have long puzzled the scientist as well as the man in the street. Lacking concrete knowledge, men have been fruitful in theory. They have offered many possible solutions. Some are extrinsic; others are intrinsic in determination. One points out that a decreased food supply such as may occur during periods of war and famine contributes to the production of more males than females. If this be true, a control of the food supply brings control over the production of "cannon fodder." Another claims that a decrease in temperature during the early stages of individual development causes maleness. Again we hear that a combination of a father, substantially older than the mother, tends to produce male rather than female. Others put the matter of sex determination in terms of a greater activity on the part of certain sperms by virtue of which the egg is fertilized by such sperms, rather than by others. Each explanation might lay claim to a certain amount of truth. There is one explanation, however, which appears to meet with the greatest amount of approval among scientific workers. This explanation puts sex determination in terms of certain peculiarities of the sex cells. Since that is the one we shall accept here, we shall try briefly to make clear its nature.

It is known that in the higher organisms one kind of egg and two kinds of sperms are produced. In man, according to reputable sources, the egg ready for fertilization has 24 chromosomes. One of the two kinds of sperm cells also possesses 24 chromosomes. For the sake of clarifying our discussion we may represent these 24 chromosomes of the *ovum* by the equation $23 + 1$. Now, instead of the 1, let us put X. This now becomes the X-chromosome, or the *sex-determiner*. The same may be done for the sperm with its 24, or $23 + X$ chromosomes. But the other sort of sperm lacks one chromosome. It has only 23. The X-chromosome is missing here. We may represent the fact that the sex determiner is absent by zero, O. The equation for the second kind of sperm then reads $23 + O$ chromosomes. If one of the $23 + X$ chromosome sort of sperms happens to fertilize the ovum, the resulting fertilized egg has 48 chromosomes ($46 + XX$); and it develops into a *female*. But if one of the lighter (lighter only in the sense that it has one chromosome, X, less) sperms happens to fertilize the egg, the resultant individual possesses only 47 ($46 + XO$) chromosomes, and it becomes a male. The female, then, is the result of something "plus." She starts with X more than the male. If we would believe some wags, she retains this X throughout life. This is essentially the story of sex determina-

tion, as the scientist sees it. Sex, in this way, is intrinsic in determination and follows the law of chance distribution. Figure 8 makes clear the way in which this determination works. We represent the egg by $23 + X$ and the two kinds of sperms by $23 + X$ and $23 + O$. If we set down an extra female cell symbol in order to complete the equation, we

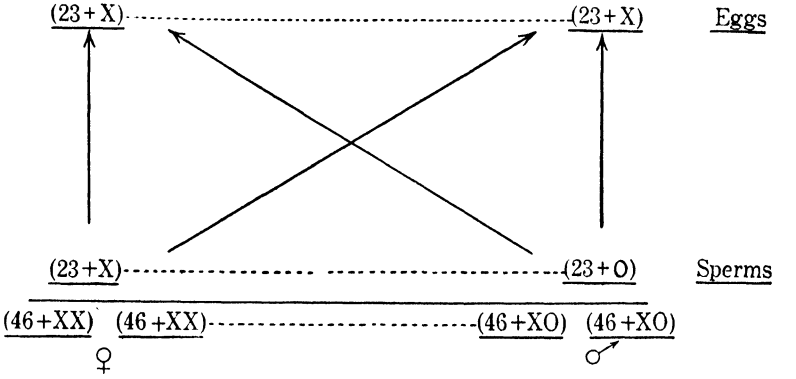


FIG. 8. Here are shown possible combinations of eggs and sperms to determine maleness and femaleness. It is assumed that the fertilized egg with the $46+XX$ chromosomes produces a female, while the fertilized egg with the $46+XO$ chromosomes develops into a male.

have the possibility shown below. From the four possible unions which we have here represented we secure two females ($46 + XX$) and two males ($46 + XO$).

Now why should we find a greater number of boys than girls (in rough ratio of 106 to 100)? Or, why should the chances favor the production of the member of one sex rather than that of another sex? We have the possible answer at hand. If this one-chromosome-lacking-sperm (the $23 + O$ sort) should be more active, it might actually reach the egg slightly ahead of its heavier "brothers" and so establish the proper basic conditions for maleness in the offspring. The chances thus reduce to unlike characters of the sperm cells. Now this is, of course, somewhat theoretical, but it is, perhaps, the most plausible explanation at hand. On the whole, the evidence favoring the explanation of sex and sex ratios in terms of intrinsic properties of the eggs and sperms seems fairly unambiguous. The environment is not assumed to play any part.

If the environment plays no part here, can we find any place in the developmental history of the organism where it does? We have now to face in that direction and survey the possibilities. Each person has, of course, an environment which differs, as we have already stated,

from all others. Some environments are no doubt socially bad; others are unquestionably good. How significant have these been in our lives? To what extent, if at all, are we able safely to say that the environment has produced changes in the course of development not only in our own case but in the lines of our progeny as well? Finally, have these changes in successive generations been achieved through the medium of the germ-plasm, or through such non-biological agencies as society, culture, and education?

HEREDITY AND ENVIRONMENT

This is indeed a very serious matter. The problem of the true determination of the human individual is in no sense purely academic. The answer we offer to this question may serve to determine our very attitude toward life. If we agree that the course of our lives is innately determined, we, as mature individuals, have no more voice in the matter of ordering them than we had in their production. Or, should we say that our destiny was truly laid down or determined, in part, thousands of years ago and, in part, at the very moment of our conception; or, should we admit that we are at the mercy of the forces of our heredity which shunt us back and forth in accordance with ways predetermined long ago; or, should we hold that our hereditary constitution works unceasingly at every turn to determine relentlessly our every act, it would appear that we relinquish every vestige of responsibility as individuals. According to some writers, our instincts given us through heredity, work in just this manner to determine our behavior. Kirkpatrick,[1] for example, tells us that "instincts, in so far as they are purely instinctive, are blind," and that man's "purely instinctive actions are just as blind as those of the bee. . . ." A man might then quite properly argue that because he was instinctively driven to commit some crime, he was in no sense actually accountable for his behavior. Consequently, he would be undeserving of punishment. Moreover, if a man is bad, it is not the man but his ancestors whom we should condemn; the individual is really deserving of our full sympathy for his misfortune in possessing such ancestry.

The Emphasis upon Heredity. Now, this emphasis upon the past is, indeed, an attractive way out. Repeatedly, sharp-tongued relatives may be heard at work, browsing around among the bones of immediate or very remote ancestors, when intent upon discussing the ways of an

[1] Kirkpatrick, E., *Fundamentals of Child Study.* 1903, 58.

erring son or a miscreant daughter.[1] It is, we hear them maintain, in the blood. It is inevitable that the boy should follow the grandfather (or Adam!); or that the girl should be like her great grandmother (or Eve!). Society, too, has repeatedly sought to wash its hands of the indiscretions of its members by attributing them to *heredity* or to innate non-social factors. Thus we have our born *criminals*, our innate *psychopaths*, our congenital *perverts*, and so on. It is so easy in this way to push the responsibility for socially undesirable forms of behavior back upon individuals who cannot rise in defense. We might point out, furthermore, that if one's heredity is everything, if our functional and structural characters are predetermined, if all of our character and our personality are set by our forebears, we are left with a striking form of fatalism. Nothing we do can possibly make any difference. We can only lean back upon our ancestry, look resignedly at the world, and when life's vicissitudes come, meekly or violently accent them according to the way we have been made. Finally, if innate determination is complete, it follows that all our educational and social agencies as effective means of control are valueless. Man is an organism, wound up by his ancestors, who plays to the end of the string and ceases. We might truthfully say, according to this way of thinking, that the individual starts to die at the moment of the fertilization of the egg, and the course of his whole life history tends definitely downhill with death as the goal.

If we cannot agree to an account of the behavior of the human individual in terms of which all that is found at the end was predetermined in the beginning, have we any alternative? When we look about us at successive periods in the developing organism, we find structures and functions in later stages not discoverable in the earlier. Time undoubtedly brings changes. Moreover, it would appear that these describable changes are not explicable wholly in terms of heredity. To what, then, shall we attribute them? We know that each of us is an

[1] The truth is "society does not like to face facts. Pride of race has been strong, hence our Mayflower ancestry—our Daughters of the Revolution. We like to boast of our ancestry. It sets us apart. We like to think that it takes three generations to make a gentleman (sometimes a lot longer!) and that we have more than three behind us. Again, on the other hand, the belief in the inheritance of tendencies and traits saves us from blame in the training of our young. The mother says when her son goes wrong—'Look at his father or his grandfather (whichever one she hates) and what could you expect with that ancestry on his father's side!' And the father, when the girl shows wayward tendencies—'What can you expect, she has always let every man she came in contact with make love to her.' If these tendencies are inherited we can't be blamed for it. Traits in the older psychologies are God-given and if my boy or girl goes wrong, I as a parent can't be blamed" (*44*, 83).

organism functioning within an environment. Perhaps the environment really offers a more satisfactory way out. Let us follow this lead a little way. We shall define the environment as any form of energy outside, or inside the organism which acts upon the organism to result in changes in behavior.

The Emphasis upon Environment. We can, of course, go to extreme lengths and argue, as do some, that heredity is of no importance, and that the individual is made by his environment. The environment under this way of thinking now becomes the powerful determiner. Thus, no hereditary differences in behavior can be found between brown and white babies. No innate functional difference between male and female can be discovered, and so on. The differences which may be found to exist in later years are attributable to differences in habits established under unlike environmental situations. Again, if conditions of temperature are modified, the individual in turn changes so that new structures may appear. If other aspects of the habitat are greatly altered, the whole life history of generation after generation of organisms, as in the case of the *axolotl*,[1] may change. If the human being suffers a decrease in one or more of the products of certain of the endocrine glands, it may develop into an idiot or a genius; a dwarf or a giant. The environment expressed in terms of chemicals liberated through gland secretions thus regulates and determines the individual's life largely after the same fashion as we found in case of extreme heredity. One becomes a murderer, a coward, a pervert, or a prostitute because of some under-, or over-production of endocrine secretion. As one writer puts it, "had the internal chemistry of Cleopatra and Octavia been interchanged, how different the history of the world would have been!"

Extreme Views to Be Avoided. We could continue with a great many citations and illustrations of this way of regarding the causal agents in human development. It seems quite clear that if we take this extreme view, we have approximately as great a degree of one-sided determinism as we should have if we accepted the extreme view of heredity. It would seem that the actual solution is not to be found in either extreme. Under the earlier teaching of Lamarck, great emphasis was placed upon the environment as the determining factor in individual and racial development. But under the later teaching of Weismann and others the pendulum appears, in many cases, to have swung far the other way, so that emphasis is laid heavily upon intrinsic

[1] A member of the Salamander family. The changes which this creature shows under a change in environment conditions are rather striking. See page 112.

or non-environmental determination. It would seem that some individuals tend to take one extreme or the other. It must always be an "either-or" matter with them. But extremes are generally to be avoided. This unquestionably applies here, for neither heredity nor environment appears to offer a wholly satisfactory way out.

The most reasonable solution lies in the acceptance of the position that the human organism, biologically and psychologically viewed, is the joint product of its heredity and its environment. Neither the one nor the other is to be unduly extolled. Man is unquestionably a product of both factors working conjointly. As Child says:

> The organism is inexplicable without environment. Every characteristic of it has some relation to environmental factors. And particularly the organism as a whole; *i.e.*, the unity and order, the physiological differences, relations and harmonies between its parts, are entirely meaningless except in relation to an external world. Nevertheless predeterministic theories have maintained that the organism as a unity and order is primarily independent of an external world and enters into relation with it only secondarily (p. 30).

One cannot take a product of two factors, such as heredity and environment, and say that the one is important, and the other is not. Even in such a simple equation as three times two equals six we cannot possibly say that three is more necessary than two. The basic foundations of one's life must be viewed in a like manner.

The Organism a Joint Product. Man is not heredity; neither is he environment. Considered racially, he is a creature which has obviously had a long history. That history must always be thought of partly in terms of environment. Considered individually, man has grown up, exposed at every turn to his environment.

> In whatever aspect we regard the organism, it is obviously in relation to environment at every point. Its mechanisms are all concerned in some way with either the dynamic or the material factors of its environment. The mechanisms and therefore the relations to environment of different organisms are, of course different, primarily because their protoplasms are different, but however these mechanisms differ, they are all concerned with reactions to environment (*6*, 9).

Never for a moment, except at the risk of giving a partial description of what actually occurs, can we escape from this fundamental truth. Child maintains, for instance, that even during embryonic development the organism has an effective environment. Moreover, at every moment of its existence the organism must function, and the *functioning* of the organism actually serves in part to determine its future. This means

that the individual functions differently because of previous performances. It is definitely inclined along certain lines because of its own previous activity.

Reaction to environmental factors by change in rate or kind of metabolism or in rate or course of development is just as truly behavior as the motor reaction of an animal to light or the movements of pursuit following the sight of prey by a carnivore. The conception of the organism as a machine which is first constructed and only after completion begins to function, *i.e.*, to behave as a machine, has been widely held in the past and still has its supporters. According to this conception the earlier stages of development are determined by heredity, that is to say, the factors concerned in the construction of the machine are predetermined in the protoplasm, and only at a certain stage of development does function in the proper sense begin. . . . Actually the organism is not at any stage a closed system, but is functioning and behaving at all times as long as it is alive. Reaction to environment is occurring at all stages of development, though of course the kinds and complexity of reaction differ at different stages according to the mechanisms present. Moreover, such behavior or reaction is itself a factor in development and therefore in the construction of the behavior mechanisms of later stages. The behavior of the various developmental stages as well as the specific hereditary constitution of the protoplasm is a factor in determining the behavior of the fully developed organism (*6*, 1).

Thus the organism tends to create its own environment. *It builds out of the past by way of its own behavior, so that there is more in life than can ever be explained—described in terms of heredity. The earlier functions in this way serve to determine the later forms of the individual's activities.*

Experimental Evidence. Perhaps a brief glance at the evidence offered by certain of the experimentalists will serve to give us a better understanding of the relative importance of heredity and environment. Let us view the character of certain changes which have been induced experimentally in the course of an animal's development and which have resulted in the production of an individual who varied markedly from the norm. Consider a case where an outstanding change has been made in the physical environment. Take for example the interesting case of the *axolotl* referred to above. This animal is a Mexican member of a salamander family. It may be purely aquatic in habitat for generation after generation. In this form it possesses external gills, preys upon other aquatic animals, and produces young which in turn spend their lives in the water. But if such a habitat is modified by gradually withdrawing the water, the animal loses its gills, develops into a land form,

moves about upon the land, preys upon land forms of life, and produces young which will, in turn, live upon the land. Because of such environmental changes, together with certain inherent potentialities for variation, the animal thus changes its whole life course. This means that the animal under certain environmental conditions develops to the larval stage, at which time reproduction occurs. The reduction of the water environment results in the animal's passing through other stages of development.

Now consider a change in the environment of a chemical sort. The effects of alcohol upon the course of development have been experimentally studied. Pearl, for instance, found that progeny of alcoholized chickens were generally stronger than those of non-alcoholized parents. The weak ova and embryos were theoretically weeded out. Again, guinea pigs kept under the influence of alcohol fumes for long periods exhibit, according to Stockard, partial or complete sterility or, in the case of actual production, a disproportionate number of greatly weakened progeny. By the *fourth* generation the defects disappeared. Among bees, the *lack* of a certain form of food apparently results in a larva developing into a sterile female. If the larva is given the proper food at the proper time, it presumably will develop into a queen. The queen appears to owe her existence to the workers who gave her the right sort of food.

Finally, consider the cases in which there is *bodily* injury. It has been shown, for example, that deliberate physical injuries to the budding individual by way of shaking, centrifuging, cutting, and cooling, during the early stages of cell division may result in the production of curious, ambiguous creatures—animals which are neither one thing nor another. Here belong animals which have many heads or many legs or double bodies; also creatures which have but one eye or are eyeless. In short, here belong the experimental monstrosities. At later stages, mistreatment by way of ovariectomy or castration results, as we know, in the development of striking changes in the total organism of a psychological and biological nature. Here again we see that the mal-functioning of the organism results in a decided change in the course of development. The evidence clearly points to the fact that, in many cases at least, the course of an individual's life is not predetermined in the germ plasm.

One further problem yet remains before we can contentedly close our discussion of this whole problem of inheritance and development. Can such changes as we have just referred to, as well as many others elicited under environmental modifications, be inherited? This is the problem of the inheritance of acquired characteristics.

THE INHERITANCE OF ACQUIRED CHARACTERISTICS

Claims of Lamarck. This is an important, yet quite vexing question. If such inheritance is possible, we have offered a very significant causal or directive factor in development, and an instrument of inestimable worth for producing improvement in human stock. We have referred to Lamarck's contentions that organisms are structurally changed under modification in function, either through use or disuse, or by over- or under-habituation; and that certain of these modifications are inherited. Thus development (Evolution) proceeds by accumulation of some and the loss of other characters. In this view, Lamarck had the very able support of Darwin. It is undoubtedly an attractive explanation, for some, of the way in which *changes* in successive generations of animal forms appear. It means, for example, that the vestigial structures now found in the human organism represent organs formerly functional. Because of *disuse*, they have gradually atrophied. They are on their way toward elimination. Or, consider those interesting forms of eyeless creatures—bats, fish, insects, crustaceans—to be found inhabiting certain of our caves. We should say in terms of this sort of inheritance that they are blind because their ancestors lost their eyes through disuse under the Cimmerian darkness of the cave, but not that they are now found in the caves because their blind ancestors by chance gathered in such places and, survival being easier, have been perpetuated. Most biologists of today would agree, of course, only to the second way.

Recent Experiments. One of the biologists of recent years who stood strongly for the possibility of inheritance of acquired traits was Kammerer. He claimed, for example, that certain of his experimental subjects—spotted salamanders—when reared on yellow surfaces, slowly lost their darker spots; they gradually turned yellow. The progeny seemed to pick up where the parents left off, and so continue to change in conformity with the background. But Kammerer's work, the results of certain phases of which were very seriously questioned by many students in the field, was abruptly terminated by his tragic death. Guyer and Smith, from results obtained by the introduction into pregnant rabbits of a toxic serum derived from chickens previously treated with a preparation from the diseased eyes of rabbits, point to the possibility of inducing hereditary eye defects in as many as five successive generations of rabbits. Here the mode is not mechanical but chemical. It may be that this form of attack upon the organism will be more fruitful in showing the possibilities of the transmission of acquired traits than where gross structural changes are induced in the parental bodies in such experiments as de-tailing or de-horning animals. It should

be pointed out, however, that the results of attempts by others at verification of the above work have seemed to cast some doubt upon their value. Finally, we cite the claim of Pavlov, as evidence indicating the possible transmission of the conditioned-reflex in albino mice. In five successive generations of mice trained to secure food at the sound of a bell the number of trials required by each generation was respectively three hundred, one hundred, thirty, ten, and five. If these results should stand, which is very doubtful since Pavlov himself has seen fit to question them, we would have a striking instance of the passing on of a functional trait established under a comparatively short period of habituation.

The Claims of Weismann. Against the claims of Lamarck, Weismann, for one, repeatedly launched devastating criticisms, both of a logical and experimental sort, which in the minds of many have served to cast serious doubts upon, if not actually to shatter, Lamarck's doctrines. Weismann rightfully contended, it would seem, that if the theory of inheritance of acquired traits did not admit of experimental verification, it could not possibly expect to command serious consideration. As proof, he cited what appears to many to be overwhelming evidence against the doctrine. From certain of his own experimental work, for instance the removal of tails from mice, he found that no changes were produced in successive generations. Moreover, he showed logically from our knowledge of the physiology of the germ plasm and somatic plasm, that there is little, if any, possibility that the acquired modifications induced in the bodily material could affect the germ plasm. He insisted that no one has produced reliable evidence that any bodily character has ever been induced through conditions *extrinsic to the organism, which has appeared in the animal stock in successive generations of progeny without the presence of the original, inducing conditions.* After denying inheritance of the Lamarckian sort, Weismann offered his own theory of inheritance which has had a very profound influence upon ways of thinking in this field.

According to Weismann's theory of the continuity of the germ plasm, to which we have earlier referred, the reproductive mechanism is wholly distinct in a *functional* way from the remainder of the body. The germ tissue is set aside in many cases within a short time after fertilization. Boveri, for instance, cites the case of one of the worms where, at the cleavage time of sixteen cells, one cell is set aside to produce the germ plasm, while the remaining fifteen go to form the body. Whether such early and sharp isolation occurs in higher forms, including man, is at

present unknown. It is not an essential feature of the theory. Germ plasm for Weismann has strictly to do with reproduction, while the body has its own—largely vegetative—functions. The germ plasm is passed directly from one generation to another, unchanged by the vicissitudes visited upon the bodily structures. The bodily structures which die off in each generation cannot affect the germ plasm. According to this way of thinking, the germ plasm is the beginning and the end. The individual body is produced by an egg which also produces other eggs which in turn produce still other eggs, and so on. The parent and offspring resemble each other merely because they *both arise from a common substance*; the basis of one is the basis of the other. They have a like origin. They are, we might say, both chips off the same old block. The parent thus passes absolutely nothing which he himself possesses as a *bodily organism* to the offspring, for his body arises and dies while the germ plasm continues unbroken. The actual basis of all inheritance is to be found in the germ-cell. The actual agents may be determiners, genes and the like, one of which in every case stands as the germinal basis for each somatic character.

We have sought within the limits of this chapter to write of fundamental processes which have profound significance for us. We have attempted to treat of forces which have operated to give us our universe and our organism. We have tried to lay bare the biological and psychological foundations of our organism in terms of heredity and environment. At the same time we have tried to clear the ground and prepare the way for a better understanding of the following chapters upon development. We turn now to consider the first of these in which we treat of the psychology of the animal. We hope to paint in bold strokes a picture of some of the psychological characteristics of animal life. The account set down here should be of interest not only for the information which it gives of the psychology of animals, but for the light which it sheds upon the significant problem of the antecedents of certain of the psychological functions of the human being.

BIBLIOGRAPHY

1. Bateson, W., *Mendel's Principles of Heredity*. 1913.
2. Beebe, W., *Galapagos*: World's End. 1924.
3. Castle, W., *Genetics and Eugenics*. 1916.
4. ————, *Heredity and Eugenics* (with Coulter and others). 1912.
5. Chauvin, M., "Ueber die Verwandlung der Mexicanischen Axolotl in Amblystoma." *Zeit. f. Wiss. Zool.*, 1876, 27, 522.
6. Child, C., *Physiological Foundations of Behavior*. 1924.
7. Conger, G., *New Views of Evolution*. 1929.

8. Conklin, E., *Heredity and Environment.* 1922.
9. ————, "Problems of Organic Adaptation." *Rice Institute Publication,* 1921, 8, 299–380.
10. ————, "Trend of Evolution" (*Evolution of Man*, ed. by Baitsell).
11. Darwin, C., *Origin of Species.* 1859.
12. ————, *Journal of Researches into the Natural History and Geology of the Country Visited During the Voyage of H. M. S. "Beagle."* 1852.
13. DeVries, H., *The Mutation Theory* (English Translation). 1909.
14. Estabrook, A., *The Jukes in 1915.* 1916.
15. Fasten, N., *Origin through Evolution.* 1929.
16. Galton, F., *Hereditary Genius.* 1892.
17. ————, *Natural Inheritance.* 1889.
18. Goddard, H., *The Kallikak Family.* 1912.
19. ————, *Feeblemindedness.* 1914.
20. Grinnell, J., *Geography and Evolution* (Ecology). 1924.
21. Herrick, J., *Brains of Rats and Men.* 1926.
22. ————, *Neurological Foundations of Animal Behavior.* 1924.
23. Hollingworth, H., *Mental Growth and Decline.* 1927.
24. Hollingworth, L., and Cobb, M., "Regression of Siblings." *Jour. of Ed. Psychol.*, 1925, 26, 1.
25. Holmes, S., *Studies in Evolution and Eugenics.* 1923.
26. Jennings, H., *Behavior of Lower Organisms.* 1906.
27. ————, "Heredity and Personality." *Science,* 1911, 23.
28. Judd, C., "Evolution and Consciousness." *Psychol. Rev.*, 1910. 17, 77–97.
29. Kellogg, V., *Evolution.* 1924.
30. McCabe, J., *Evolution of Mind.* 1910.
30. McDougall, W., "An Experiment for the Testing of the Hypothesis of Lamarck," *Brit. J. of Psychol.*, 1927, 17, 267.
31. Morgan, C. L., *Emergent Evolution.* 1923.
32. Morgan, T. H., *The Physical Basis of Heredity.* 1919.
33. Neuman, H., "Production of Monsters." *Biol. Bull.*, 1917, 37.
34. Pearl, R., "Experimental Modification of Germ-Cells." *J. of Exper. Zool.*, 1917, 22.
35. Pearson, K., *Grammar of Science.* 1900.
35-a. Pintner, R., "The Individual in School." *Foundations of Experimental Psychology.* 1929, 697.
36. Rutherford, E., "Disintegration of the Elements." *Science,* 1924, 19, 561.
37. Stockard, C., "Racial Degeneration in Mammals Treated with Alcohol." *Arch. Inter. Med.*, 1912, 10.
38. ————, "Influence of Alcohol and Other Anaesthetics on Embryonic Development." *Amer. Jour. of Anat.*, 1910, 10.
39. ————, "An Experimental Study of Twins, Double Monsters and Deformatives and the Interaction among Embryonic Organs during Their Origin and Development," *Amer. J. of Anat.*, 1921, 28, 115–277.
40. Stockard, C., "The Effect on the Offspring of Intoxicating the Male Parent and the Transmission of Defects to Subsequent Generation." *Amer. Nat.*, 1913, 47.
41. Thomson, J. A., *What Is Man?* 1924.

42. ————, *Concerning Evolution.* 1925.
43. ————, *Heredity.* 1908.
44. Watson, J., *Behaviorism.* 1924.
45. Walter, H., *Genetics.* 1913.
46. Weismann, A., *Evolutionary Theory.* 1904.
47. ————, *The Germ-Plasm.* 1893.

CHAPTER V

THE PSYCHOLOGY OF THE ANIMAL

> And her mate sits beside her and sings her a song—
> He sings to the wide world and she to her nest,
> In the nice ear of nature, which song is the best?
> —Lowell

An outstanding and very significant aspect of man's effective environment is found in the form of his subhuman friends, enemies, neighbors, associates, and servants. These have tremendously affected man in a great variety of ways. The presence or absence of animals, predatory or non-predatory, has greatly modified man's ways of living. Where human life moves on constantly under the dread of attack by ferocious beasts, it cannot develop to the degree possible where such devitalizing fear is lacking, for fear leaves little room for anything else. The necessity for securing animal food no doubt occupied a great deal of the time of early man. At the same time it furnished him with occasions to create elaborate rituals; thus it permitted the partial expression of his aesthetic talents. Dead or alive, the animal has supplied man with nourishment and shelter. Dead, it has partially created and fertilized his soils. Domesticated, it has given him protection against danger, motive power for transportation and for the cultivation of his land, and both comfort and pleasure as a refuge against isolation and loneliness. Alive and untamed, it has afforded a constant source of relaxation in the form of the excitement of the chase and of the hunt. Alive and uncontrolled, it has caused the death of untold numbers of human beings, and brought suffering to even greater numbers. Through crass ignorance and fear, man has repeatedly condemned and consecrated the animal. He has placed it, as in the case of totemism, as the fountainhead of his family. In times of great uncertainty he has looked to the animal as a source of information concerning the nature of future happenings. Divination by means of animals has seen wide employment. In his more religious moments man has actually created his gods in the form of animals. And in his more scientific moments he has found his origins in the lowly organisms. "He has learned to bottle his parents' twain in the yolk of an addled egg." It is quite worth while, so it would

appear, to spend a short time in considering the nature of the psychological life of the animal.

The Value of the Study of Animals. According to Smith, "The study of mental phenomena at the earliest stage of their appearance helps to demonstrate the more primitive, fundamental, and inalienable characteristics of mind (*62*, 1)." And McDougall points out that the study of animal behavior is highly significant for psychology because it teaches four lessons:

> (1) It makes clearer the nature of purposive action and reveals its prevalence throughout the whole of the animal world: (2) it elucidates the very foundations of human nature, by displaying in relative simplicity among the animals the modes of action (namely, instinctive actions) which are fundamental in human behavior, but which in human life are so complicated and obscured by the great development of our intellectual powers that their full importance is only now beginning to be recognized: (3) it shows us how we may conceive the structure of the relatively simple mind of an animal, and so gives us a valuable cue for building up our description of the structure of the human mind: (4) for it reveals some of the stages which the mind must have passed through in the long course of mental evolution from animalcule to man (*45*, 57).

Before we pass into a discussion of the several problems of the psychological nature of the subhuman forms as they occur at successive levels in the animal series, we wish to consider briefly certain general problems which are frequently raised in connection with a discussion of the psychology of the animal. We repeatedly hear such questions as, "Does the animal (as generally opposed to the human being) have a mind," or, "What kind of mind does the animal have?" Again, "Where do we find evidence of the beginning of mind in the animal series?" We wish to consider briefly some of these problems.

The Mind Considered as Synonymous with Reasoning. The answer to the first problem depends, for our purposes, upon the definition which we give of mind. Some deny and some grant mind to animals. The reasons are not always the same. Some individuals deny that animals possess mind because they cannot reason. Thus, reasoning is made to stand as a test of mind. Upon reflection, however, such individuals readily grant that mind is unquestionably to be attributed to very young children who, nevertheless, are apparently devoid of reasoning ability. Reasoning, so the functionalist would maintain, is one of the ways in which the mind works. It would not seem good logic, then, for us to maintain that mind is necessarily equivalent to one of its functions.

Again, some persons would maintain that an animal has no mind because it has no soul. Mind and soul, for such persons, are largely identical. Quite early in considering the problem of the animal mind a sharp distinction was raised—a kind of impassable gulf fixed—between the animal and the human being, largely because of the confusion of these two categories. Where mind is seen as a kind of rational soul we can readily understand how a sharp separation between human and infra-human organisms could readily be drawn. Man possesses, but the animal lacks this unique possession.

Others, again, would make of mind a kind of adjustive agency which animals do not possess. The human being makes his environmental adjustment through the aid of consciousness. The animal, however, responds in terms of reflexes, tropisms, or instincts. Judd, for example, tells us, "The processes of human adaptation are different from those of animal adaptation just because human adaptation is determined in character by consciousness (*31*, 78)." Again we find that some persons mean by mind the same qualitative variety found in man. It is equivalent to the sum of all the sensory, imaginal, and affective processes characteristic of the human being. But it seems a little unfair, we say, to demand that the whole range or variety must be exhibited before we can agree that the animal has any mind. Should we say that, because an animal lacks visual sensation, it cannot have mind? Or, because it has no images, it must lack all mind? To use a crude analogy, it is equivalent in such cases to saying that one must have at once gold, silver, paper, and copper money before one can be said to have any money. Finally, mind may be taken to mean the existence of various mental processes or qualities, but not necessarily the same number and qualitative variety as we find in man. If mind is the whole of experience of a creature regarded as dependent upon a nervous system, as some would maintain, we can then have mind in the animal even though it is not equivalent, either qualitatively or quantitatively, to that of man.

Two Extreme Tendencies. Now we find two outstanding and extreme interpretative tendencies with regard to this problem of the existence of mind in the animal. Some individuals, after considering the structure and the behavior of animal forms from amoeba to ape, tend strongly to humanize the animal. That is, they are definitely inclined to interpret the activities of the various animals, particularly the higher forms, in terms of a like degree of feelings, wishes, and motives, as these are found in the human species. We say that they are anthropomorphic in their interpretations of animal activities. Of course, all interpretation of the animal *mind* must rest finally upon our psychological

knowledge of the human being. The human being has certain structures and certain mental processes. The assumption is made that the animal, in so far as it possesses structures like the human organism, must have mental processes similar to those of the latter. Or, a certain type of behavior of the human individual is accompanied by certain mental processes. If the animal exhibits human-like behavior, it must have human-like processes. To the degree to which the animal is anatomically and behavioristically like man, the inference is made that it has a mind like that of man.

But anthropomorphism usually means more than this. It is being guilty of overlooking obvious differences both in structure and behavior between man and the animal. One has but to turn to the literature on animal folk-tales to find the animal frequently raised to a level equal to that of man. From uncritical acquaintances one learns that pet dogs, for instance, shed tears, sulk under scolding, or gradually pine away under grief at the loss of a loved one. But in making such statements, such persons really have an excellent example to follow in the person of Darwin. For Darwin, as we know, was strongly inclined to anthropomorphize the animal. Many of his descriptions of animal activities show a confusion between fact and interpretation, or a neglect of obvious differences between animal and human activities. Darwin sought material evidence as proof of the closeness of the relationship between the animal and the human being. The more nearly the animal approached man in its behavior the clearer was the evidence, Darwin knew, favoring the principle of genetic continuity. Among contemporary psychologists, McDougall is inclined in this same direction. For example, he grants to the ordinary earthworm, among other abilities, those of comparison, judgment, and choice.

Opposed to this extreme humanizing attitude is the tendency to mechanize the animal. To some, man is essentially godlike; but the brute is machine-like. Animals, accordingly, are supposed to act blindly in the light of instinctive determination, while man *may* act in the light of reason. Man has long been taught that the world and all its animals were formed for his own particular pleasure. He has thus been given the right to use animals as he desires. Partly, no doubt, because of this extreme prejudicial attitude, animals have been set aside from man as comprising a distinctly inferior world. Descartes, too, contributed to this position, for he supposed that the body was essentially machine-like in its operations, while the mind was a kind of rational soul. Animals unquestionably possess the bodily part, but they lack the human part—the mental. Consequently, they are essentially machine-like in their behavior.

These are extreme views which appear to some persons to be somewhat inadequate to many of the observed facts. Such individuals would place themselves between these two extremes. They would not deny all mind to the animal; neither would they completely humanize it by attributing to it essentially the same sort of characteristics as are found in man. They would take the facts of animal behavior and of structural similarities and differences as found between man and the animal. From these, in the light of the principles of genetic continuity and psycho-physical relations, they would draw their interpretations concerning the animal mind. They would assume that as bodily structures (sense organs and central nervous system) vary, so does mind. All comparisons would be made in terms of the structures and the functions of the human being. In this way, they would build the order of the mental series in the animal. Here is the old method of analogy put to work in psychology. This method has its obvious dangers and its limitations. As a possible safeguard to his interpretations, the student of the animal is urged to observe, within reason, a form of the principle of parsimony, which advises him to interpret the behavior of an animal as due in all cases to the exercise of a lower, rather than of a higher mental activity. This does not mean that he should necessarily go to the extreme and ignore the facts of his observation. He should remember, in this connection the warning of Mills: not to be too ready to adopt unduly simple explanations of animal activity.

Evidence of Animal Mind. Let us consider a few of the behavior criteria of mind which have been raised.[1] That is, if you were asked to point out the evidence from behavior upon which you would base your assertion that your dog, as representative of animals, has a mind, what would you offer? Let us consider some of the possibilities. You might point out that your dog is able to solve problems. If it is put in a box from which it may escape by pulling a string, it will come eventually to pull the string. But some would maintain that this whole behavior is a kind of chance "bouncing around" until the right thing happens, just as an object may be bounced around in a pan with unequal perforations in the bottom until it escapes through one of the holes.

Again, you might say that the animal learns, and therefore it must

[1] According to Yerkes, "It is no more necessary to inquire whether a given animal has mind than it is to ask the same question concerning the human infant. We have every reason to believe that many animals have minds, and it would be as absurd to deny this statement as to contend that the human infant is not conscious because it cannot introspect or is not self-conscious. Animals have minds, and it is the business of the psychologist to study their characteristics to the best of his ability" (*79*, 231).

possess mind. Loeb, as we know, accepted the test of associative memory as the criterion of consciousness in the animal. But it has been contended that all animals learn. Thus, all would possess mind. Can we say, on the other hand, that if an animal should not learn that it may safely be said not to possess mind? It is recognizably possible that an animal might be highly conscious of many things and still not learn to do a particular act. Again it might learn, defining learning in terms of differences in behavior as a result of past happenings, and yet not possess mind. We know that if we fold a piece of paper, it tends to fold again in the same way as before. Its behavior, we can say, is quite different because of past events, but we need not, of course, say that the paper was consciously bending. Again, it might be argued that if an animal learns or adjusts quickly, it must be conscious. The rapidity of learning is taken as indicative of the presence or absence of ideas. Very rapid learning is considered as meaning ideas, and the presence of ideas is proof of the existence of mind. Morgan cites the case of a chick that picked up a caterpillar, dropped it, and thereafter refused to touch such creatures. In one such experience of a moment's duration, it learned to avoid such prey.

There is, too, the fact of sensitivity, which is taken to mean that an animal moves under stimulation. You shout, and your dog jumps; you pinch it, and it howls. But it may be pointed out that inanimate (non-mental) objects move under the application of physical and chemical energy. Moreover, the animal may actually have a mind, yet not move under the application of such stimuli. Man, for example, may be highly conscious of stimulation, yet not move to any observable degree. If an animal, however, is differentially sensitive, does it not mean that it is conscious of some things but not others; that is, that it has certain qualities of mind but not others? But we can find clear evidence among inanimate forms of responses to certain forms of energy but not to others.

Moreover, one might contend that because the animal faces situations in which some selection between two objects is offered, it must have mind in order that the one may be taken. You set food before your dog and command him to eat. The animal eats, although the food is presumably distasteful. For example, Goltz points out that his decerebrated dog refused to take meat that had been treated with quinine. But his normal dog, with its brain *intact*, picked up the meat on command, dropped it, made a wry face, and under further encouragement, bolted it down (*61*, 262). We might say that the second dog was consciously guided. But it can be pointed out that the selection of one thing rather

than another cannot, of itself, be evidence of mind, since a chemical reagent will select one and not another particular bit of chemical material. From all this, it should be understood that there is no single behavior criterion by means of which the presence or the absence of mind may be determined.

Where Does Mind Appear in the Animal Series? Should we grant mind to the animal, we then have the further problem as to the place in the animal scale where mind first appears. Concerning this point Smith writes. "Unless we set out with the preconception that mind is the prerogative of man, the question whether mind is coextensive with living protoplasm or is the possession of only the more highly organized animals must at some time suggest itself. But, whatever prejudices we may hold, it is incumbent upon us, before definitely accepting either view, to ascertain, if possible, the level at which the first manifestations of mind occur (*62*, 1)." Some psychologists would maintain that mind is truly as old as life; that, in fact, it began simply as one aspect of that unknown thing called life and has slowly evolved to the stage now found in man. Other individuals would maintain that mind appeared at some relatively late period, when the original physiological equipment of simple reflexes and stereotyped instincts failed properly to conserve the organism. Under a breakdown in this predetermined way of behavior, mind appeared as the device possessing great survival value and so kept the organism moving. Under such a point of view the position most often taken is that a compounding of the simpler functional elements of nervous action, such as reflexes, served to produce mind. It is difficult, however, to understand how a mere compounding of unconscious reflexes could ever eventuate in conscious behavior. The origin of mind, then, we must say, is as baffling to the psychologist as the problem of the origin of life is to the biologist. They are both theoretical and not strictly scientific.

An Objective Approach to the Animal. The above orientation, we feel, is necessary. If one wishes to hold to a purely mental view, here is a way of approach. We must make clear, however, that in our subsequent discussions of the problems of animal psychology we shall neither raise the question of a separate mind nor draw upon the method of analogy. We shall go rather to the animal and attempt to discover what it is actually capable of doing; that is, how it functions or behaves under unlike conditions both extrinsic and intrinsic. We shall consider it exactly in the same way that we seek to discover *what* the human being can do, or *how much* he can do, under various conditions. We shall assume in all these cases that the animal is a *total organism* which be-

longs to the same kingdom as does man. We do not mean to imply, however, that the animal must possess all of the functional capabilities found in man, for we surely assume that development has made significant contributions. These contributions are *both* qualitative and quantitative; that is, there are differences in kind as well as differences in degree. We shall expect to find some activities like and some different from those types found in man. And we shall expect, finally, to find activities in the animal which vary in degree or amount from those found in man.

Now how shall we study the animal? How can we investigate it, if it is unable to relate its experiences? We assume that we can go to it just as we go to babies for an understanding of the early psychological life of the human being; or, for that matter, to a steam engine to find how much it can pull, hoist, push, or handle. Neither the baby nor the engine can speak, but we can investigate both. The same holds true with the animal. We shall go with open eyes and closed mouths to study it. We shall consider its actual performances. We shall ask whether, in terms of its actual behavior, it can discriminate or perceive its nest, its mates, its food, and the like. We shall ask whether it is able to delay the execution of some task and for how long.

We shall observe whether it is able to solve problems and, if so, the kinds of problems; we shall look to the variety and degree of its emotional life; we shall seek to discover something of its learning ability—that is, the rate and the amount. We shall try to catch some glimpses of the limit of the animal's abilities, just as we ask concerning the largest number of objects the human being can see at a glance. Our task will be perfectly straightforward. It is neither the way of all mind, nor the way of all flesh. We shall be concerned neither with simple processes, or elements of the animal *mind*, nor with twitching muscles. We shall be concerned with the performances of the whole animal. In our discussion we cannot possibly go to all animals; we must be selective. We shall try to discuss representative forms, knowing, of course, that one animal is, after all, not another. That is, we do not learn about mud-puppies by studying water-spaniels.

METHODS OF STUDYING ANIMAL ACTIVITIES

The Anecdotal Method. We might begin our study of the psychological lives of animals by accepting the oldest of all methods of securing information about the animal; that is, the method of the anecdote. We know, for instance, that everyone has heard or read of some extraordinary feat of some animal. Stories of this sort, we must realize,

usually involve single cases which come through many mouths. Often there is a complete lack of knowledge of the individual history of the animal, as well as a total disregard of so-called negative cases, in which nothing like the type of behavior described actually happened. Thus it is extremely difficult to evaluate them. Thorndike points out quite cleverly:

> Dogs get lost hundreds of times and no one ever notices it or sends an account of it to a scientific magazine. But let one find his way from Brooklyn to Yonkers and the fact immediately becomes a circulating anecdote. Thousands of cats on thousands of occasions sit helplessly yowling and no one takes a thought of it or writes to his friend, the professor; but let one cat claw at the knob of a door, supposedly as a signal to get out, and straightway this cat becomes representative of the cat-mind in all the books (*64*, 24).

Moreover, when we realize that the average individual is most likely to confuse observation of fact with inference, our task becomes still more difficult.

Consider the case of the person who tells us of her canary, of which she is quite fond. Upon being liberated, the bird flies, we learn, into an adjoining room. Our friend steps to the door and speaks to it, whereupon it immediately flies into its cage. The fact that the bird did this, she claims, is evidence of a high degree of intelligence and understanding. In narration, she apparently forgets the history of the bird, which involves being repeatedly forced from the room and into its cage. Again, she overlooks the negative cases in which nothing happens at the usual command, so that she is forced to resort to non-verbal means. She tends, in common with most, to confuse observation with inference. Thus we are told that several times she has seen the bird busily engaged in building its nest, but since no nest ever eventuated we know that all she saw was the bird carrying straw. No one, we assure her, ever observed a bird building its nest. But her case, we sensibly realize, is after all typical of the majority of persons who own pets which are observed to be more intelligent than those of others.

The Naturalistic Method. A second method is known as the *naturalistic* or field method. This way may be fruitful in the hands of one trained to observe—one who knows something about the behavior of the species to which the animal under observation belongs and something of the individual history of the animal. One may "observe," for example, that the snake at night follows the toad. Here is a problem which may be successfully attacked experimentally in the laboratory. We may seek to determine whether snakes are guided by visual, auditory, tactual,

or olfactory cues. We may thus add to our understanding of the psychology of the snake. This method is of considerable value, then, as a source of experimental problems as well as a means of securing information at times about animal behavior under conditions in which experimental control is largely impossible; *viz.*, under conditions of undisturbed habitat. This method is of considerable value in giving us knowledge about such problems as hibernation, migration, courtship, care of young, and the like.

The Experimental Method (Non-Training). But the naturalistic method is not quite so valuable, on the whole, as experimentation in which the aim is to introduce careful control so as to bring out knowledge of the causal factors of animal behavior or to discover the limits of an animal's ability, *etc.* This way has its obvious limitations, but on the whole it may be extended to a wide range of animal activities. Of this general method of investigating the animal, we find two forms; the one is the way of *non-training.* Here some problem is set for the animal which does not involve habituation. Perhaps an object is moved away from the entrance to the nest of an insect to see whether it goes and comes in the usual manner or is disturbed. The Peckhams have very cleverly employed this method with certain insect forms.

Again, food may be placed before an ape in such a way that he cannot directly reach it. He can, however, secure it by pulling this food toward him by means of a string, by resorting to the use of a stick, or by piling one box upon another box. Valuable work of this sort with apes has been done by Köhler, Yerkes, and others. Or, we may desire to know the way in which different animals behave under auditory stimulation. Thus, Galton took his whistle with him to the "zoo." A great many very interesting studies have been made in this manner, and some of them have contributed materially to our understanding of some of the psychological abilities of the animal studied. Let us cite two further illustrations.

Many persons believe that the vulture has a very keen sense of smell. But it has been found, using the non-training method, that vultures might stand upon the highly fetid but canvas-covered body of an animal without exhibiting evidence of excitement. However, upon being shown the body of the animal, their whole behavior changed. Moreover, they were unable to discover food hidden in a ravine, but when a trail was made by dragging an animal through the grass to the ravine, they followed and thus secured food. The vulture, apparently, makes considerable use of vision in securing food.

Finally, let us consider the so-called *Preference method.* If one wishes

to determine, for instance, the manner in which an animal discovers the position of its mate, at a distance such that it cannot be touched, one might proceed as follows. Assume that we are interested in the behavior of one of the insects—for example, the cricket. Two boxes—one transparent, the other opaque—may be arranged before the female. A male cricket is confined in each box. The one in the transparent box is prevented from chirping. It may be seen but not heard. The female is permitted to make her choice, while the one male obligingly chirps. Where clear preference exists, as found in this case, it would seem that we could safely assume that the animal makes discriminations on the basis of audition.

The Experimental Method (Training). The second form of the experimental methods is the so-called *training method.* Here the animal is studied in an environment which is familiar (unless the purpose is to study directly the behavior in an unfamiliar environment) so that there will be no resultant excitement, fear, undue exploration, and the like. In order to elicit activity an appeal is made to the animal by way of some strong need such as hunger, sex, shelter, search for other members, escape from punishment or confinement, and the like. So long as the animal is kept mildly hungry, results can be secured. Or, if it is sexually stimulated, a measure of the degree of the urge in terms of the obstacles which the animal will overcome, the distances which it will run in its attempt to satisfy its needs can be obtained. Schiller's remark that hunger and love are the ruling forces of the universe certainly holds true of the average animal subject.

Extra-Organic Changes. Such dominant urges as these are of inestimable value to the animal psychologist. The animal must be motivated, else it will not work. One may, of course, punish the animal by a shock administered by means of an electric grill, by dropping it into water or by paddling it with a board. Yerkes, for instance, has maintained that on the whole, punishment is more effective than reward. Where it does not unduly disturb the animal it seems to be an excellent means of promoting the establishment of action patterns. Under the control of the experimental method the animal can be highly habituated to a given set of conditions so that very precise ways of acting are established. Any single one or more of these external conditions may then be altered in a known way, either qualitatively or quantitatively, and an understanding of the significance of such modifications for the animal's behavior obtained.

Intra-Organic Changes. Again, the animal may be altered by inducing new psychological or organic states, after which a measure can

be secured of the significance of such changes. The animal may have some part of the receptor-conductor-effector mechanism temporarily or permanently changed through operation, by means of an anaesthetic, by use of drugs, or by starvation. If some highly habituated pattern is set up, and then the animal is *operatively* changed by removing receptors or conductors, we may be able to select out the particular structures drawn upon by the animal in such behavior. Let us illustrate the use of this *method of extirpation.* Men have long been interested in discovering the means by which an animal, such as the rat, is enabled to learn a maze, for example, like that shown in Figure 9.

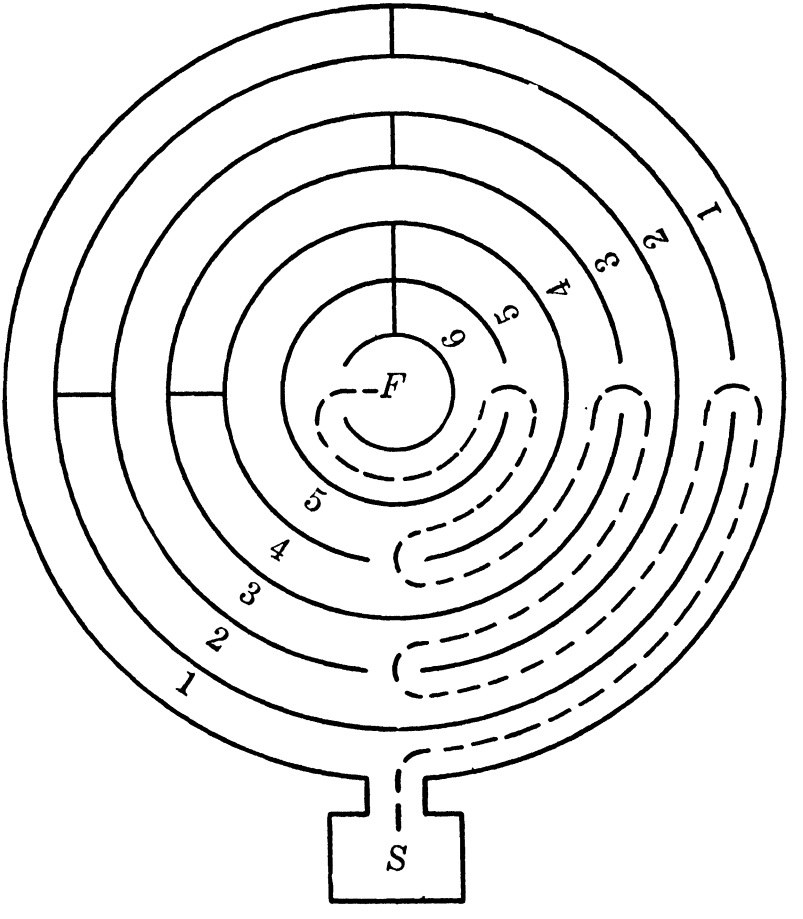


FIG. 9. Circular maze showing the true pathway from the starting-box (S) to the goal (F). The animal must learn to avoid the blind alleys, 1–6.

In 1907, Watson (*71*) attacked this problem by successively and simultaneously eliminating the more important receptors (eyes, ears) of his rats. But his animals, he found, could still acquire the maze habit. He argued that the patterns were established in terms of kinaesthetic and organic processes. The running of one part of the maze actually served as the stimulus which released behavior in the remaining parts. Watson and Carr later found that if the animals were put down at random in the maze they would apparently pick up the cue by running some segment which then released the correct pattern for the remainder of the maze. But more recently Lashley (*40*), after training rats to run a maze, so sectioned the spinal cord as to eliminate the kinaesthetic impulses. The animals, however, "travelled the maze without significant errors." It is maintained, therefore, that the maze habit cannot be interpreted as a series of kinaesthetic and motor reflexes but must be referred to some intraneural mechanism which produces a series of integrated movements without directive sensory cues.

By using such technique, one may go through the various perceptual abilities of many animals and secure some understanding of the *degree* to which they are employed by the animal; how far the animal is able to extend them in new situations; and how easily the animal is disturbed by their loss and so on. The data gathered may be stated either qualitatively or quantitatively. As a rule, quantitative measures permitting of comparative statements may be given in terms of the time required for training (or retraining), the number of trials required by various animals to learn (or relearn), the number of errors made (before and after changes), the distance travelled (before and during the test series), and the degree of shock required to discourage the animal.

The Conditioned Reflex. This same method applies to the whole range of conditioned reflex studies in which, generally speaking, only one variable is employed: some visual, auditory, tactual, olfactory stimulus or excitant. After the subject has been trained, the old stimulus may be removed; or a qualitatively new one may be added. The old stimulus may be increased or decreased, or some combination of these made in order to determine the part which each of these plays in the animal's behavior. If an animal has been conditioned to salivate in response to a particular vibration rate and no other, we can test the degree of auditory discrimination by presenting a rate different from that to which it has been trained. This particular method is very valuable in the conduct of certain types of experimental problems.

Obstacles. Finally, the conditions may be changed by way of the addition of some obstacle; spatial, temporal, or intensive. The animal

may be taught to follow a pathway to secure food. The pathway may then be changed. New doors may be opened, or old doors may be closed so that the setting up of a new way to the goal is necessitated. In this way, we can learn something of the ability of the animal to lay aside old and take on new action patterns; also some notion of the degree of interference, transfer, and the like. The obstacle may take the form of a mere temporal delay during which the animal is restrained from completing or carrying out the established habit patterns. Hunter, McAllister, Tinklepaugh have each used the method with various subjects (rats, cats, dogs, raccoons, children, apes) to determine "delay" ability in the animal. Tolman and Sams used such a method to determine the ability of rats to discriminate time differences. Again, the shock given by a grill which lies in the floor of the pathway to the goal may be gradually increased to determine the degree required to thwart the completion of a behavior pattern. Or the shock may be kept constant and the incentive varied to get at the relative strength of each. Finally, by keeping both the shock and the incentive constant, the organism may be varied and so get at the strength of the drive at different periods in the life of the same animal. In connection with the study of animal drives, we think of the contributions of such individuals as Moss, Jenkins, Warner, Warden, and Dashiell.

We have sought to make clear the more outstanding methods which may be employed in the psychological study of the animal. We have not tried to elaborate greatly upon this topic of method. We have attempted to give the barest treatment possible and yet provide the student with some understanding of the way in which the animal psychologist proceeds. Without some knowledge of the methods of studying phenomena, it is extremely difficult to appreciate or to evaluate the work done in a given field. We are desirous that the student realize, even if it is only in a vague way, the nature of scientific methods as they are employed in the field of animal psychology. We feel that this brief presentation should give a deeper appreciation of the problems and technique of animal psychology. We have as yet before us the task of understanding the behavior of animals at various levels in the scale of life. There is no better approach, as we view this problem, than by way of a discussion of the development of the neural basis of behavior. We now face in the direction of the nervous systems of unlike forms of animals.

THE DEVELOPMENT OF THE NERVOUS SYSTEM IN THE ANIMAL SERIES

Introduction. Some knowledge of a comparative sort of the nervous systems of the animal forms is necessary for an intelligible understand-

ing of the nervous system and the behavior of man; for we recognize that man's nervous system has gradually developed as one phase of his total organism, which, we assume, has had its simpler moments. We wish to run quickly through the animal scale touching very briefly upon the various types of *nervous systems*. We must remember always that these are agents directly and intimately concerned at all times in the production of behavior. Our task does not call for the detailed and comprehensive account such as one finds in a text on anatomy or comparative neurology. We seek here to scan representative nervous systems in our endeavor to find in the animal some basis of understanding of the complex activities of man as partly mediated through his elaborate nervous system. That is to say, we are looking for the antecedents of man's neural equipment. We must be warned in the beginning that we shall not find a simple way that leads straight from the amoeba to the anthropoid ape and so on to man. We shall not strike the trail of a central nervous system like that of man until we arrive among the vertebrates. That is, if we take the cerebrum with its cortical rind as perhaps the most characteristic feature of the central nervous system of man, we find no traces of it until we reach the vertebrate level.

We know that higher animals exhibit many unlike forms of activity under dissimilar conditions. The environment, in the form of chemical and physical energy, acts upon the organism to produce charges in its structural and behavior patterns. The receptor organs, conductor organs, and effector organs function under these environmental agents to produce highly integrated patterns of behavior. All three factors are inseparably bound up with each other in the task of inducing such activity. Of these three, the nervous system especially gives unity and coherence. It binds all parts of the body together into one highly co-ordinated functional unit. If we could speak of one part of the receptor-conductor-effector unit as being more important, we should so regard the nervous system. In the performance of its function of integrating all parts of the organism, it is far more rapid and more capable of modification than the blood and the lymph, for example, which represent chemical modes of organic integration. Our task now will be to discover the simple beginnings of the bodily conditions of behavior and to show how these develop by way of differentiation and specialization to give the structures and functions of the higher forms. Following our discussion of the bodily conditions of behavior we shall try to give a developmental view of behavior.

Protozoa. Among the unicellular organisms we do not find any clear structural differentiation by way of receptors, conductors and

effectors. The one cell performs all of these functions as well as many more. It is irritable or sensitive; it also conducts; and it contracts. This is prettily shown in case of the bell animalcule (See Figure 10).

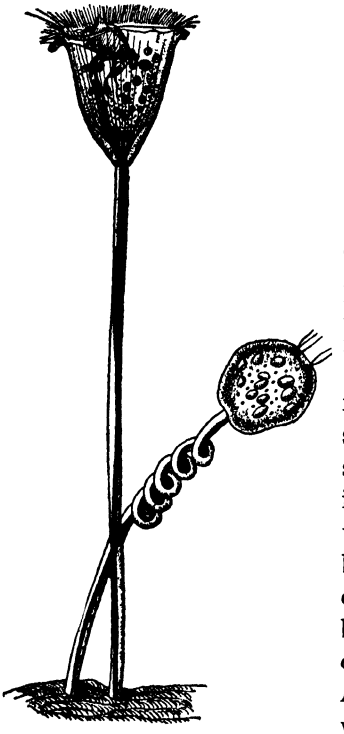


FIG. 10. The bell animalcule in the expanded and contracted condition. From C. J. Herrick, *Neurological Foundations of Animal Behavior*. Henry Holt and Company.

This stalked protozoan is able upon being stimulated to shorten its stem in the manner shown and thus swing away from the source of stimulation. In it, according to some, a hint of muscular tissue is to be found. But there is neither receptor organ nor nervous material. The effectors, if such actually exist in the creature, thus appear first in the development of the receptor-conductor-effector mechanism. Muscle, then, is more primitive than nerve.

Poriphera. In the sponge, we find more clearly defined muscular tissue; but still there is neither nerve nor receptor, as such exist among the higher forms. Here in this fixed form of animal life we have a vaselike bodily structure. There is a body wall perforated with many small openings which serve as inlets into a large body cavity. At the top there is a small opening which we may call the *mouth*. Around the mouth is a band of muscles which upon being directly stimulated contract to close the opening. Almost any stimulus—mechanical, thermal, electrical or chemical—is effective in producing this closure. There is no differentiation, or selection, in terms of reception. All stimuli appear to affect the animal in a like manner. It is, in fact, quite impartial. It has essentially one response for all. Here, without true receptors and conductors, we find the bodily functions of receptivity, conductivity, and contractility tied up in a single bit of tissue. The sponge clearly represents the first stage in the evolution of a neuromuscular mechanism. The primitive muscle tissue found here represents the true basis of that elaborate integrative device of the higher forms. In the sponge we find substantiation of a long held theory that the effector organs developed before neural tissue appeared, as opposed to

the position that they evolved simultaneously. Concerning this point Parker writes:

A receptor or sense organ alone would be of no service whatever to an animal; it would resemble a telephone receiver disconnected from the rest of the system. In a similar way the adjustor or central organ is useless without at least some other element in the reflex apparatus. The only mechanism sufficient in itself is the effector, which, if it can be brought into action by direct stimulation, may accomplish something serviceable to the animal. It is therefore improbable that we shall find multicellular animals that possess either receptors or adjustors without effectors, but it is conceivable that primitive metazoans may have effectors without other parts of the typical neuromuscular mechanism.

Cœlenterata. In this level of life we come upon the two remaining members of the receptor-conductor-effector device, for here we discover the simple beginning of specialized nervous tissue and differentiated receptor cells. In the hydra, we are told, certain cells are found each of which combines, within its own structural limits, all three of the major functions of sensitivity, conductivity, and contractility. There is also the beginning of specialization in conductor and effector structures. The one end of the cell which faces toward the surface of the animal and so comes into contact with the environmental forces of the world is receptive in function. The opposite end, the one lying farther within the body wall, is contractile in function. Here is a *single* cell which serves the three offices of reception, conduction, and contraction.

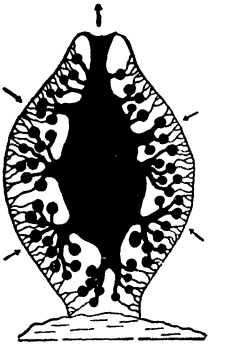


FIG. 11. THE SPONGE
A very simple stage in the development of the receptor-conductor-effector mechanism. From G. H. Parker. After C. J. Herrick, *Neurological Foundations of Animal Behavior*. Henry Holt and Company.

In other forms—for example, the sea anemone (See Figure 12)—there is a cell essentially sensitive in function which extends backward into the body wall and ends at other cells essentially contractile in function. Here, now, is a *receptor-effector* unit composed of two anatomically distinct parts, each characterized by its own function. This stage of neural development represents a distinct advance over the simple form of the sponge in which there was no structural differentiation. According to Herrick the advantages of such a mechanism as this are as follows:

(1) The sensory cell is structurally adapted to respond to weaker stimuli than is the surrounding protoplasm; that is, the threshold of excitation has been lowered. (2) Different sensory cells may be differently organized so

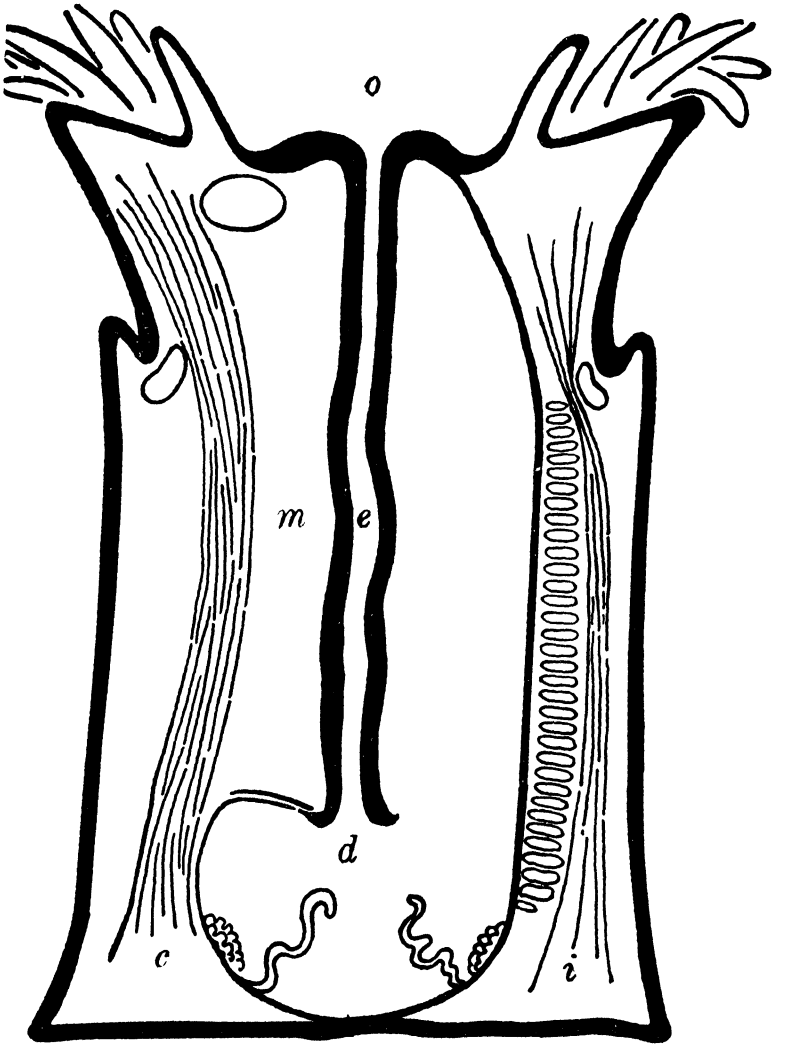


FIG. 12. Sea anemone. A slightly advanced stage in the development of the neuro-muscular mechanism. From G. H. Parker, *The Elementary Nervous System.* By permission of J. Lippincott Company.

as to be responsive to different kinds of stimuli; for example, the threshold of one may be lowered for pressures, and of another for stimulation by chemicals. Here is the beginning of the differentiation of the separate sense organs.

(3) The protoplasmic filament is structurally modified to facilitate rapid conduction, giving truly nervous, as contrasted with the "neuroid" type of transmission and making possible much more rapid responses. There is, however, no special mechanism for connecting this activity with that of other parts of the body except the immediate vicinity of the spot stimulated, and the correlation of the actions of distant parts of the body remains on a plane scarcely removed from the "neuroid" type of conduction seen in the sponges. (*21*, 90).

In still other forms (jelly-fish) of this very large and important group of animals, certain cells which are essentially *conductive* in function appear *between* the receptors and effectors. With their many branches they constitute a primitive system of the nerve-net type by means of which every receptor is connected with every effector. See Figure 13. All parts of the system are closely interwoven to form a continuous conductive medium between the place of receiving the stimulus and the scene of action. Here is provided a means of delivering the energy, released in the surface of the body, to all parts in a more efficient manner. As animal forms increased in body size, there was a need for further organization. The neuroid mechanism was altogether too slow; the filament structures of the anemone described above were not adequate to join outlying regions. "Hence it was," as Parmelee tells us, "that where rapidity of conduction was needed, a special class of cells began to develop whose special function it was to carry these stimuli and thus connect the different parts of the organism together. These cells are usually elongated and stretch out protoplasmic threads in the direction in which the stimuli are to travel" (*52*, 145).

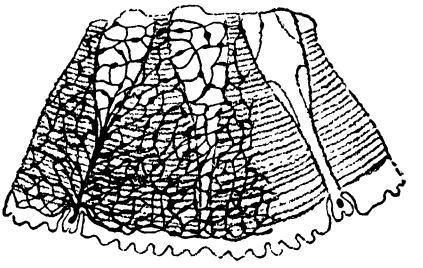


FIG. 13. Nerve net from a jelly-fish. The muscle fibers are indicated by gray shading, the nerve fibers by the black network. From C. J. Herrick, *Neurological Foundations of Animal Behavior*. Henry Holt and Company.

Here is another great step forward, we may say, in the development of a type of integrative mechanism that more closely binds the organism together and unifies behavior. There are certain distinct improvements here over the simpler two-celled (receptor-effector) mechanism of the anemone type. This stage, in turn, has its advantages. These are (1) "the excitation has a greater range of application, and total responses to stimulation and integration of larger and more complex bodies are possible; (2) reinforcement, and (3) inhibition of response are facilitated"

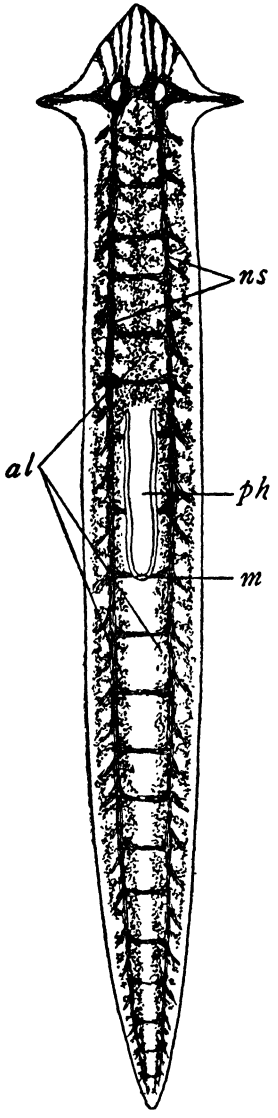


FIG. 14. A simple worm (Planaria) showing the ladder type of nervous system (ns), the alimentary canal (al), and other parts. From Child. After Herrick, *Neurological Foundations of Animal Behavior*. Henry Holt and Company.

(*21*). In this type of nervous system there is as yet no control over the direction and the destination of the neural impulse. Every neural impulse aroused by the application of a stimulus to the organism tends to distribute in all directions throughout the whole of the neural ramifications and gradually die out as the distance of the outspread becomes greater. Under such conditions of transmission, the entire musculature of the animal may be thus thrown into activity as the wave of neural change slowly extends itself over the animal. It is quite similar to that state of affairs which we find in the human being when, under great emotional excitement, the nervous energy may spill out generally over many nervous pathways and so produce a shouting, sweating, panting, gesticulating, red-faced, disrupted organism.

Annelida and Arthropoda. With the worms we come upon a great advance over the earlier types of neural structures described above. There is a definite tendency toward the production of a type of nervous system in which one region, the head, plays a very important part. Among the worms is found the beginning of a developmental neural series that in certain respects, for example, head dominance, is carried through the remaining animal kingdom. Nervous systems of a type very similar to that of the worm are found among the crustaceans and the insects.

Now we assume that the student knows that the animals of these groups are segmented; that is, the body is divided into a number of parts. The nervous system in the earthworm, consists of two rows of grouped nerve cells lying side-by-side and *ventral* to the food canal. There is a pair of these grouped nerve cells, or ganglia, in each segment of the animal. Each ganglion is connected with every

other by means of longitudinal and transverse nerve fibers.[1] These two sorts of fibers give front-back and right-left control respectively. Each pair of ganglia serves as a source of control over its own particular

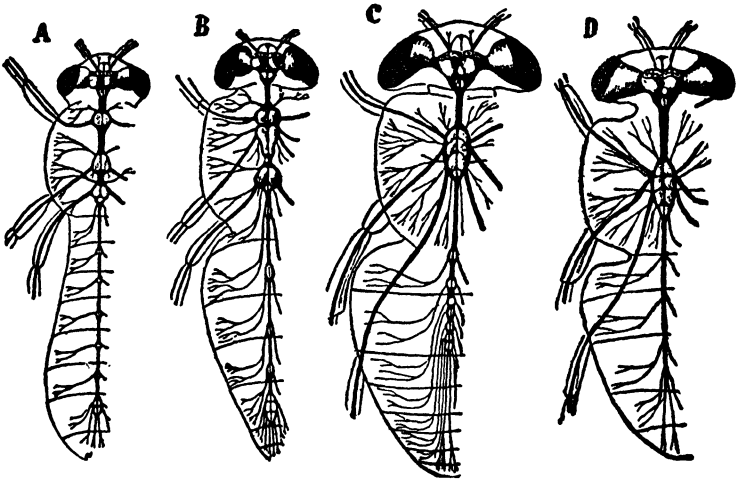


FIG. 15. The Nervous Systems of Four Kinds of Flies, to illustrate various degrees of concentration of nervous material (ganglionic material). From Herrick, *Neurological Foundations of Animal Behavior*. Henry Holt and Company.

bodily segment. This double chain at its forward end develops in the earthworm in such a way as to encircle the œsophagus. There are two head ganglia which are relatively larger than the body ganglia. One (the supra-œsophageal ganglion) lies above the œsophagus and one (the sub-œsophageal ganglion) lies beneath the œsophagus. Together they constitute the brain of the animal (See Figure 16).

A Primitive "Brain" Now Appears. In the worms we come upon the primitive brain in the form of an enlargement of a group of nerve cells. This brain exercises primitive control over all other ganglia, although each ganglion lying between the front and the rear regions has a certain degree of power. In some of these animals, single fibers run directly from the brain to the extreme posterior region and so enable the brain to exercise its control without interference from intermediate ganglia. Among the insects, speaking generally, we find a step toward greater neural centralization and concentration. The head, the thorax, and the abdomen are each the scene of this closer marshalling of nervous forces. All three work together, yet each may work alone. For example,

[1] The student will find in Figures 14 and 15, sketches of the nervous systems of some representatives of the worms and insects.

egg-laying may go on, in some insects, even where there is just a small portion of the posterior part of the nervous system together with the egg-positing apparatus left. Under local stimulation, the eggs are squeezed out.

Among these animals, we still find remnants of the nerve-net system. But more significant for us is the fact that much of the system is similar

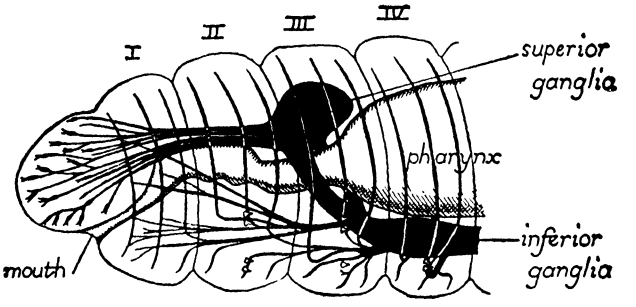


FIG. 16. A very primitive type of brain (the earthworm). From C. J. Herrick, *Neurological Foundations of Animal Behavior.* Henry Holt and Company.

to that found in man; it is synaptic. In this type, each nerve-cell is anatomically distinct from all others. It is not joined or fused with other nerve cells. The conductive cells are thus contiguous and not continuous as in still lower organisms. The place of meeting between two such cells is known as the *synapse.* It is functionally a place of tremendous significance both for neural conduction and for behavior. We find among other functions that the synapse (1) delays the transmission of the neural impulse; (2) permits the impulse to pass in one direction only; (3) is more susceptible to fatigue than other neural regions; (4) is the region of great modifiability or plasticity and makes possible a high degree of coördination, precision, and selection in behavior. It contributes greatly to differentiation in bodily activity, for the almost infinite number of connections between receptor organs and effectors permits of a great variety of responses. The individual is thus provided with the potential means of avoiding the whole organic upset characteristic of the nerve-net type of conduction.

Behavior Under the Synaptic System. Under synaptic control, as in *man,* the energies from a "thousand" receptor organs may all be commanded and marshalled toward one single outlet. Thus light, odor, and sound may all combine to produce the quick out-thrust of the arm to the piece of burning steak. Or the neural impulse from a single set of receptors may spill out over a "thousand" pathways to arouse the or-

ganism to great activity. A whispered word may thus release action involving most, if not all, of the body. Again, the synapse permits of release of energy now to one, now to another member of a pair of antagonistic muscular systems. In walking, for example, the thrusting forward of the one leg serves to inhibit (temporarily block) the neural pathways to the other; but a second, or a fraction of a second, later, energy "flows" out along these pathways to result in the forward extension of the other leg. The second leg actually functions differently because of what has gone on just previously; *i.e.*, the fact that the other member of this pair has been active. Here, and in thousands of other actions as well, we have the phenomena of neural facilitation and inhibition which are built to a great extent around the synapse. The appearance of this type of mechanism among the annelids and the arthropods is thus a signal event. It marks a great step upward.

The Nervous System Among the Higher Animals. Here belong all the higher animals. Here also belongs man. We must say a word about this vast system; but we cannot speak in details. Our task, in short, is just the reverse. We are hurrying through the animal series in an attempt to provide a perspective or a long-section view. Our account is sketchy but not inadequate if it serves its purpose,—namely, of providing a hint of the origin and development of structures and functions of interest to the psychologist. We are trying to paint in large strokes. Should anyone be especially concerned, however, with the details of one or more of these various types of nervous patterns, he can easily turn to the literature upon each of these forms and study at length. But here we must keep our faces resolutely ahead. Among the vertebrates the outstanding tendency is to bring the central neural masses together, not in small ganglionic centers as we have found in preceding species but rather in the form of a long, smooth, continuous tube, composed of an enormous number of nerve-fibres and nerve-cells all closely interlaced and interwoven. Among the vertebrates only the barest hint of bodily segmentation remains. In the divisions of the backbone and in the pairs of spinal nerves which are sent off regularly from the central mass, we have the remnants of a much earlier segmental arrangement of the body and the nervous system.

There is another significant difference between the vertebrates and the lower forms. In the former we find a change in the position of the central nervous system, with respect to the food canal. The central nervous system is now found on the dorsal side of the alimentary canal instead of the ventral. Moreover, we have a supporting mechanism in which this system is housed; namely, the backbone. The organism

can now assume many positions impossible with the lower animals. There the body, in many cases, is fairly rigidly supported by a hard outer shell. Among the vertebrates a great many varieties of behavior are made possible because the animal's body is extremely flexible yet easily capable of supporting and protecting its nervous system. Furthermore, the anterior end of this central nervous mass is tremendously enlarged, especially in the highest forms, to constitute the brain. Of the brain in man, the largest portion is the cerebrum. Of the cerebrum the most important part is the cortex, or the thin rind of gray matter. This material unquestionably constitutes the primary source of the highest forms of organic control. It is the cortex, which presumably inhibits, which facilitates, which delays, which is plastic and yet at the same time tenaciously retains the effects of previous functioning.

The Cortex. Into the development of the cortex, as found in man, have gone the slow accumulations of eons of time. Even among some of the vertebrates, for example the fishes, we find no well-differentiated cortex (See Pallium, Figure 17). There are only the regions in which it appears in the still higher vertebrate forms. In the birds and among the reptiles we find the earlier stages of the cortex more clearly defined. Even in the lowest forms of mammals there is a great advance over the lower vertebrate forms, in terms of amount of cortical area present. And from there on we find a steady increase, until in man we discover a cortex that is twice as massive as that of one of the huge apes of man's own bodily weight.

With this brief summary of the development of the receptor-conductor-effector device for the production and integration of behavior, let us now turn to a discussion of the functional activities of the animal at various developmental levels. We shall confine our statements to the following topics: perception, memory, imagination, emotion, understanding, and thinking. That is to say, we shall now be concerned with the consideration of the possible antecedents of human abilities.

THE PSYCHOLOGICAL ANTECEDENTS OF HUMAN BEHAVIOR

Perception. Mechanical and Chemical Stimulation. Lacking structural differentiation—that is, with no specialized structures either for the reception of stimuli or the production of diverse kinds of movement—the behavior of the protozoan is on the whole quite simple. The Paramoecium, for example, responds to the most diverse kinds of stimuli by moving away; by withdrawing. It has a fairly definite and somewhat stereotyped mode of removing itself. The cilia, which serve as propulsive agents, reverse the direction of their motion; the animal backs

up, and again advances. As it moves forward, it rolls over or rotates around its long axis. The rolling over serves partly to turn slightly the anterior end of the animal in a new direction, so that the animal is enabled by continuing this forward-backward maneuvering to turn away from an obstruction. Figure 18 makes clear how this type of avoiding behavior enables the animal to escape from the object *A*.

The Response of Hydra to Chemical and Mechanical Stimuli.

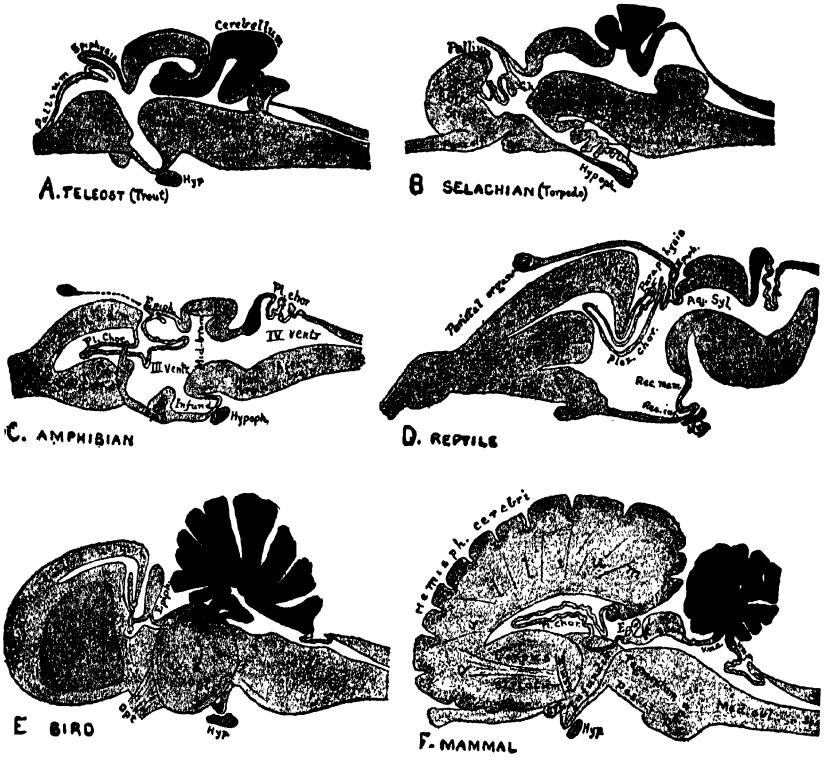


FIG. 17. A comparative view of the brains of a fish, a torpedo, an amphibian, a reptile, a bird and a mammal. Note especially the development of the cerebral regions (Pallium). From Bailey and Miller, *Embryology*. By permission of William Wood and Company.

Among the cœlenterates we find a slight advance over the protozoan type of behavior. There is, it would seem, a greater variety of actions. Thus, the hydra (See Figure 19) gives clear evidence of a change of behavior with a modification of the internal state of the organism under the continued absence of food. The animal becomes restless; it moves about by turning end over end. It sways here and there. Upon securing

food, it again anchors itself and remains fairly quiescent. If it is stimulated locally along its stalk, the region directly stimulated contracts, resulting in the animal's free end being bent over toward the source of stimulation. If the animal is repeatedly stimulated in this way, it will

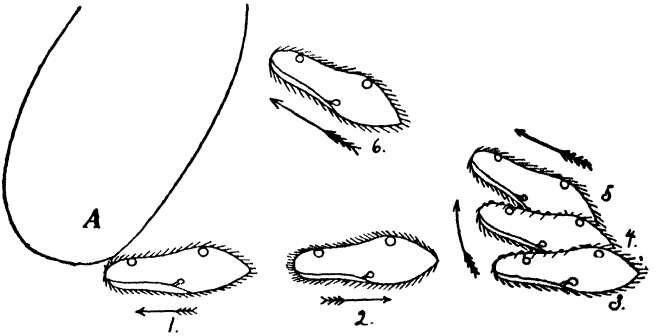


FIG. 18. Showing avoiding reactions of a paramoecium. From H. S. Jennings, *The Behavior of Lower Organisms*. By permission of the Columbia University Press.

suddenly change its mode of behavior. It will now release its anchorage and loop awkwardly away. Here is a striking change in the behavior of a creature under the repeated presentation of the same stimulus. It probably means that more and more of the organism becomes involved

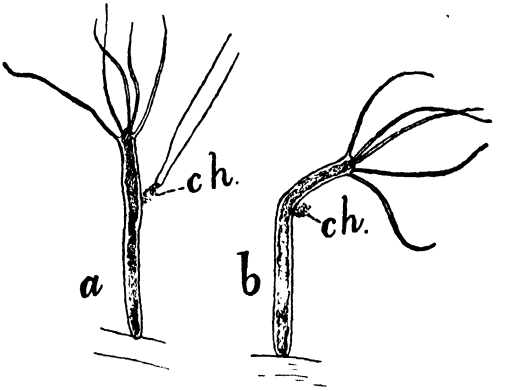


FIG. 19. The hydra, a simple cœlenterate animal. Here is shown a response to a local stimulus. From Jennings, *The Behavior of Lower Organisms*. By permission of the Columbia University Press.

by the widespread dissipation of the bodily impulse, so that the whole animal is involved. A different form of behavior is thus called for, and the animal walks away.

As a rule, among the simpler forms, chemical stimulation without simultaneous mechanical stimulation does not release the food-taking response. It means that the animal is, to a certain degree, not discriminating. Yet it will not ingest everything offered it. Given two forms of stimulation, chemical and mechanical, food-taking behavior generally follows; but the animal may completely change its behavior while the mechanical stimulus remains unchanged. For example, after the hydra has accepted food of a "tricky" sort (paper soaked in meat juices, quinine, *etc.*) placed upon its tentacles, it may suddenly change before the food is actually ingested and as a result cast it off. When the animal has been unfed for some time, its discriminatory abilities appear to become decidedly blunted. It will now frequently accept objects of a non-food sort under mechanical stimulation alone; the objects need not produce any chemical reaction. If we wished to anthropomorphize, we would say that the animal is becoming desperate. It realizes that its chances are very slim. It must take advantage of every opportunity. It thus grasps at straws.

Worms Show Increased Diversity of Behavior. Among the annelids there is a much greater variety of responses under stimulation. Upon the application of certain chemical, mechanical, or thermal stimuli, the animal may retreat quickly by contracting its body; it may respond by waving the anterior region in the air; it may squirm or twist; or, if in motion, it may turn aside and continue in a new direction. The type of response appears to depend both upon the physiological state of the organism and upon the qualitative and quantitative nature of the stimulus. Thus, following a period of repeated stimulation during which we may assume that a heightened degree of irritability is induced, a stimulus which formerly elicited only very moderate responses may now result in pronounced activities. Again, one degree of a stimulus may result only in a turning aside, while a very strong stimulus will throw the whole organism into violent convulsions (twisting and squirming). The earthworm is apparently sensitive to chemical stimulation, although the source may not be in actual physical contact with the animal. It is barely possible, however, that the stimulation is tactual and not olfactory. Thus, acids and the like may be diffused in sufficient amounts to serve as skin irritants. The animal appears to be unable to detect the presence of water, which is absolutely essential for its existence, except through actual contact. It may move about near a spot of water and dry up, unless by chance it happens upon the water. It will withdraw from dry and rough surfaces (blotter and sandpaper) unless its body is becoming fairly dry; then the animal appears to lose

some of its sensitivity—at least the environment becomes less effective.

Throughout this whole group, internal factors appear to play a more important rôle than among the lower forms. The animal does not appear to reflect the environmental changes quite to the same degree as found in still lower forms. The internal control takes the form partly of general physiological states induced through lack of food, water, and the like and partly of states of the "central nervous system." The neural control may be quite local, or it may be initiated for the first time in the animal series by the head end. In locomotion, for example, we find each pair of ganglia partially controlling the activity of each segment of the worm. Ordinarily, if the head end is mildly attacked, the animal does not start immediately to move the posterior end. The head end contracts and perhaps immediately extends again in a new direction. The animal may thus explore the region ahead. If the stimulus is repeated, the head end will again contract. The rest of the body may in turn contract as the neural impulse sweeps along the animal. Then the posterior region is thrust out in retreat. It would seem that if the attack is quite forcible, the long fibres extending aft from the brain may throw the animal into activity without the closing up of the bodily segments from the direction of the head to the tail, as preparatory to the out-thrust of the posterior region.

In the arthropods there is still greater differentiation in the behavior under chemical stimulation. Mechanical stimulation is unnecessary here in order to elicit food responses. The crawfish, *e.g.*, will respond differently to meat juices and acids applied directly to different parts of the body or slowly filtered to the animal through the water. The animal may thus withdraw the entire body when acid is applied or it may rub the affected place. When meat juice is brought either in contact with or near the head end, the "hungry" animal becomes quite restless. It moves about, usually working its mouth parts. Again, much greater coördination is found here than among the lower forms. Instead of sluggish behavior characteristic of many of the still lower forms we may have very rapid activity. This is most clearly seen in the crawfish (among the crustaceans) when the animal is in hasty retreat.

Chemical Discrimination among Insects, Fish, and Dogs. Among the insects we come apparently upon an extremely high degree of chemical discrimination, particularly of the olfactory sort. Here the animal may employ such resources, not merely for the purposes of securing food as is largely true of the lower forms, but for use in the perception of nest mates, foreigners, *etc.* If the members from one colony of ants are introduced among members of another colony, a battle immediately

ensues, which continues, presumably, until the odor gets so strong that the ants are unable to discriminate between friend and foe. The battle then ends. Bethe bathed some members of an ant colony in the body juices of crushed enemies (the word is used only to mean that if creatures fight, they are enemies). When these treated members were reintroduced into their own homes, they were met with open jaws. The odor of the enemy upon them released fighting behavior in their nest mates. Again, it is pointed out that a *female ant, after the nuptial flight*, will be received without question into a colony which under ordinary conditions would destroy her. Moreover, we know that two swarms of bees may be placed within the same hive, if both are sprayed by some mixture which presumably destroys their "fighting odor." Among the insects we find the olfactory sense apparently functioning, for the first time to any appreciable degree, in mating activities. Very striking illustrations of the use made of the olfactory sense in mating are to be found among certain of the moths. Riley (57) found that if he caged a female Ailantus ("Tree of Heaven") moth in the open and released a male marked for identification one and one-half miles away, the male shortly sought out the female. Fabre showed that the exposure of a female of a species quite rare in his community resulted in a short time in the gathering of a large number of males. When the female was enclosed, however, in an air-tight box, no males appeared.

Among certain of the fishes there appears a high degree of sensitivity to chemical stimulation. Whether it is olfactory or tactual, or both, is not quite clear. Some fishes clearly respond to chemicals applied directly to the skin, or to food placed in the water. According to some, the barbels surrounding the mouth of some species are both tactually and olfactorily sensitive. In the catfish it has been shown that the functional removal of olfactory membranes, either by operation or by blocking, results in a loss of discrimination between food and non-food objects. It has been repeatedly pointed out that certain fishes are sensitive to slight differences in the salinity and temperature of water, by virtue of which migration over fairly great distances is supposedly made possible.

Among the mammals we know that very keen discrimination both of an olfactory and chemical sort may be made. It has long been known that many of the "wildest" animals may be approached without difficulty so long as the advance is made to their leeward. It has been shown, moreover, that a well-trained police dog is able to pick out from a pile of sticks the one piece of wood upon which a person momentarily rests his fingers. The dog has merely to smell the person's hand in order to make his correct selection. The dog in these experiments was not

even confused when required to discover the stick, although it was handled by others before going into the pile. The evidence indicates that the ability to make perceptual discriminations in terms of olfactory qualities clearly increases in successively higher forms. Just how far we may safely extend this generalization—that is, whether we can say that there is a progressive increase up to man—is a difficult matter to decide. It would seem from the variety of evidence at hand that man is actually excelled in olfactory keenness by some of his animal neighbors. It may be that the assumption of an upright position, thus bringing man's nose away from ground, has resulted in the development of other forms of perception at the expense of olfaction.

Auditory Sensitivity in Fish, Frogs and Higher Vertebrates. Until we arrive among the arthropods there is small reason for expecting any form of auditory perception, for that immense world of animals below the insects is a mute one. Among insects, however, a wide variety of sounds is produced. A great many sound-producing devices, some very elaborate, are found among these forms. Are we to say that the squeaking, chirping, trilling, rasping sounds made by many of these animals have no significance, except as sources of irritation and pleasure to man? Are the many members of these sound-producing species stone-deaf? It is indeed a difficult problem to handle. Some would say that because these sounds are produced, they must serve some purpose. Because they exist, they must have utility. We shall, however, not raise that point. Of what use if not for hearing are the structures which some call primitive ears? The answer commonly given is that they are equilibratory devices. They are the forerunners of those elaborate structures known as the semicircular canals, by means of which man, among other animals, maintains his upright position or perceives changes in his bodily position. It may be that the perceptual discriminations of insects, which some call auditory, are in reality, tactual. Some suggest that the delicately formed antennae of certain insects serve as "receivers" to pick up air vibrations. There is little clean-cut evidence to show that the members of this whole group of arthropods are able to discriminate sound. A large number are, no doubt, able to respond to mechanical vibrations. Crickets, and perhaps a few other forms, may respond to auditory stimuli.

Among fishes the evidence in favor of auditory perception is about as unsatisfactory and as ambiguous as in the case of the arthropods. Kreidl, for instance, was unable to stimulate his fish subjects, either by immersing a vibrating object in the water surrounding the fish or by suspending it above the water. But Parker maintains that some fish

clearly hear. In his investigation, Parker used two types of stimuli. The one experimental arrangement consisted of a bass-viol string attached to a sounding board at one end of an aquarium. By this means he could mechanically vibrate the water. As a second stimulus arrangement, he used a tuning fork of the vibration rate of 128 per second. This second arrangement was entirely *independent* of the aquarium. His subjects (*Fundulus*) were (1) normal fishes; (2) fishes in which the auditory organs had been destroyed or the auditory nerve cut; and (3) fishes in which the ears were functionally intact, but in which the skin of the animal was insensitive. The first and third groups of subjects clearly responded to the stimuli as judged by an increase in the respiration rate, but the second (earless) group did not respond to the second stimulus. Their ears were lacking, and they were deaf. It would appear from such studies, as well as others, that certain fishes perceive auditorily; that is, they do not respond to vibration rates wholly in *terms of tactual resources.*

The lateral line, easily observed in some fishes, serves too, according to Parker, as a kind of primitive ear. It enables the fish to respond to mechanical stimulation of a vibratory sort in some cases even below the limen of the human ear. Fish in which this is functionally absent do not respond when the water or the aquarium is slightly jarred. Normal fish, however, dart quickly about.

Yerkes sought to study the frog's ability to hear. He was unable to elicit responses to sounds given alone, although he found that sound stimuli presented simultaneously with other stimuli tended to facilitate the latter. It is generally believed, however, that frogs hear and respond to the call of their mates during the mating period. Among the higher vertebrates, auditory perception in one form or another is unquestionably found. But it would seem likely that many hear only noises, not tones. Johnson's results, for example, indicate that dogs are *tone*-deaf. Other experimentalists, however, do not wholly agree with Johnson in this point. The evidence, in many cases, is not entirely unambiguous. There is reason to believe that some of the higher vertebrates undoubtedly hear as well as, if not better than, man.

Visual Stimulation. Light sensitivity probably exists throughout the whole scale of life. At least, avoiding responses to light stimulation can be obtained even among the protozoans. Such creatures respond to light just as they do to mechanical, thermal, and chemical stimuli. Some avoid, and some select lighted areas. Here again, the particular type of behavior appears to depend, to a certain degree at least, upon the degree or the quantitative values of the stimulus. Animals which

may move toward the light when it is fairly weak may move away when it is made stronger. What is true of protozoans holds largely for those animals, found higher up in the scale of life, which do not possess well-formed eyes. The prevalence of color sensitivity among animals is quite another matter. The difficulty in determining whether the animal actually responds to true differences in wave length (color tone) or merely to brightness differences is very great. Thus an animal (even man) may be totally color-blind and yet discriminate very accurately between two differently colored objects of unlike brightnesses. In order to give a slight knowledge of the magnitude of the task of determining color vision in the animal, we wish to point out a few of the methods which have been employed in this direction. We can do little more than enumerate them.

Testing for Color Vision. We find, for example, among the non-training methods, such tests as the amount of *pupillary contraction*, the *rate of breathing* under stimulation of different wave length, *changes in skin coloration under changes in the hues*, *selection of one colored habitat* rather than another, and so on. The *experimental* method of training has also been widely used here. Thus, food may be regularly secured by an animal from a background of a given color. This color is then placed among non-colored (gray) objects. Some of these gray objects are lighter, some are darker, and some are equal in intensity to that of the training color. The animal is then given an opportunity to select the color which was formerly associated with food. Again, the animal may be presented with food and at the same time may be shown a color. A measure of the amount of saliva secreted is secured. After the association has been clearly established, the original stimulus color is changed, and any effect upon the degree of salivation is noted. If there is no change in the amount of saliva produced, the intensity of the color remaining the same, the animal is said to be color-blind. This is the method of the conditioned reflex. Pavlov, using it with dogs (See Figure 20), secured evidence indicating total color-blindness. Again, an animal may be taught to select one of two colored stimulus objects. These two colors are then varied greatly in intensity—the one up, the other down, and *vice versa*. If the animal steadily refuses to be disconcerted, it is assumed to have color vision.

From his studies upon this phase of animal perception, Hess argues that color vision does not appear in the scale of life until we reach the amphibian. Others, for example Von Frisch, maintain that color vision appears among the *Crustacea*. Among the insects the problem becomes quite vexing. Some maintain that bees and other insects are

guided to flowers largely in terms of their bright and gaudy colors. Others maintain that such creatures are totally color-blind, and are guided in terms of olfaction. It is an interesting fact that while so many of the plants visited by day-flying insects are colored, a large number of night-blooming plants visited by night-flying insects are colorless and highly odorous. The arguments on both sides are numerous. We cannot raise them here. Again, among the mammals the evidence seems to indicate a lack of color vision in many forms. Doubt has been cast by

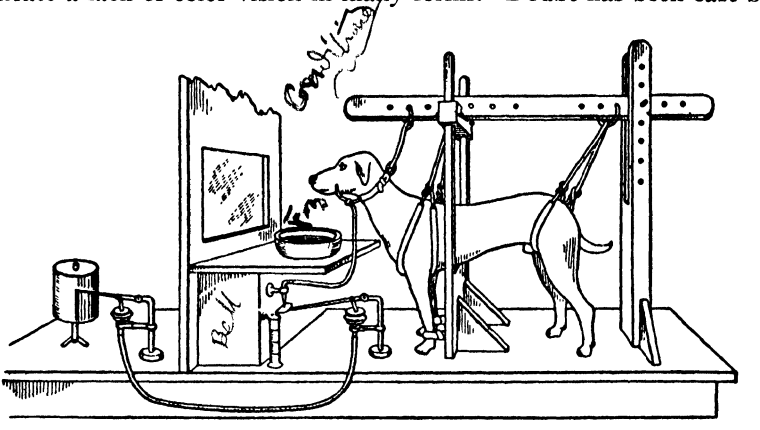


FIG. 20. Pavlov's dog. Food is presented in the dish through the window. A second stimulus is given before or at the same time. Saliva flows into the graduated glass receptacle. Each drop is recorded on the smoked drum behind the screen. From Yerkes and Morgulis. *Psychological Bulletin*, 1909.

the results of experimental work upon the common belief that the bull sees red, and so becomes infuriated. We recognize in this connection that it cannot possibly be the seeing of the redness, as such, which excites the bull. If it were, we should rightfully expect him to gore his own sides or the sides of his mates each time he (as a red bull) turned his head so as to view his own red body or when he looked upon his own red mates. There must, of necessity, be something other than *redness* to induce angry behavior. Finally, such primates as monkeys and apes appear, on the whole, to possess color vision equal, at least, to that of man.

Size and Form. For perception of size and form of objects, either visual or tactual, we would scarcely look below the starfish. This creature, with its movable arms and its ventral surfaces plastered with sense cells, is capable of some degree of object exploration. Here we have at least the bodily basis for securing information about the form of objects. We know that the starfish will walk over its prey and clasp

its arms about it in a characteristic manner, preliminary to the feeding process. These creatures, however, do not attempt to seize everything which comes their way. There is, it would seem, a certain degree of touch discrimination. Among many of the insects with their centralized nervous system, their well-formed mouth apparatus, and their jointed legs which permit of the capture, manipulation, and intake of food; of the carrying of the food, eggs, and larvae about; of the constructing or excavating of nests; of fighting and so on, we should expect to discover a still closer contact with the objects of the world by way of form and size. Among the insects the visual apparatus, too, has evolved to give the simple beginnings of visual size and form. Bees, it is said, are able to discriminate between circles and squares after being trained to secure food from one or the other. Among the birds and the mammals we come upon clear evidence of very keen visual and tactual perception of size and form. In many cases in these respects they equal, if they do not actually excel, man.

Generally speaking, however, animals appear to be inferior to man in visual form discrimination. An excellent comparative study upon the perception of form in chickens, dogs, and monkeys was done by Johnson (*30*). The subjects faced two lighted fields upon which black bands could be shown. The intensity of the field and the width of the bands could be accurately controlled. Johnson wished to determine the answer to such problems as the following: (1) How much must the width of the bands on one field be increased to enable the animal to discriminate that field from a plainly illuminated field. (2) What is the smallest amount of increase in the width of one set of bands needed to enable the animal to distinguish one banded field from another. (3) At what angular degree must the lines on one field be set in order to produce discrimination between them and the lines on the other field. (4) How much increase in the *intensity* of the bands on one field is required to produce a discrimination when the bands on the other field remain constant. He found that the ability of a chicken to discriminate between a banded and a plain field was about one-fourth that of a monkey. The ability of the monkey to discriminate between the two stimulus fields when the bands were of different widths was ten times greater than that of the chick. The limen or threshold of the chick for differences in the direction of the bands was about 30 degrees, while that of the monkey was about 5 degrees. The monkey was able to establish this last sort of discrimination in about 20 trials, while the chick took about 600. Dogs were less successful than either the chicken or the monkey. It took chickens and monkeys less than 400 trials to distinguish, for in-

stance, between banded and plain fields, but dogs were unable to discriminate even after a thousand trials, although the bands were greatly enlarged for them. When the intensities were varied, however, the dog was able to distinguish between the two fields.

Perception of Distance. When we turn to the problem of the perception of objects at a distance, we must look only to those animals which have fairly well developed visual apparatus. Probably not until we reach the *Crustacea* do we find the beginning of such perceptions. Some snails appear to be able to avoid objects as far away as 12 inches. Here is perception of distance of a primitive sort. About the same degree of ability appears among the spiders. These animals, we know, are able to pursue their prey and leap upon it over distances as large as 4 to 6 inches. According to some, insects are allegedly able to return to their nests from fairly great distances in terms of visual perception. Certain species of fish are credited with the ability to shoot down insects hovering several inches above the water. And we know that birds have the ability to perceive fairly great distances. The vulture, for instance, appears to rely largely upon vision for the location of food. A laboratory means of determining the ability of certain animals to perceive distance consists in placing the animal upon a platform which is then lowered or raised to the place at which the animal will or will not jump. This method is somewhat complicated, however, by life habits of different animals. Thus, Yerkes, working with turtles, found that the water species would jump off the board without hesitation at distances much greater than those which brought complete immobility to the land sort. Water turtles, it would seem, are so accustomed to jumping off places that they are less timid about jumping.

Homing Behavior. In completing our discussion of the topic of perception we wish to refer to the use made of it by some animals in *homing* activities. The study of the ability of an animal to return to its nest, shell, cote, or hive has long held much interest for the student of animal behavior. Many studies have been made upon this type of behavior, and many explanations in terms of reflexes, tropisms, instincts, habits, intelligence, and mysterious senses have been offered. We wish now to give a brief account of this form of animal activity. We shall run through and attempt to point out certain experimental findings which tend to make clear the character of the homing performance, as well as the nature of certain resources employed in such activities.

Bethe found that covering the hive with branches and removing "landmarks" adjacent to the hive did not interfere with ability of the bee to return to it. Moreover, he secured evidence indicating that the

bees could not be guided by olfactory resources. As an outcome of his studies, he was forced to postulate the existence of some mysterious directional force by virtue of which the bee is "tropistically" guided to its hive. Some form of energy may be assumed to radiate from the hive, or from the spot occupied by the hive, to draw the creature home. Tropistically regarded, it would mean that when it is lacking its load of food, as McDougall, in criticism points out, the bee must be negatively tuned to the hive. When in possession of food it becomes positively tuned to the hive and so returns! But other sources of evidence seem to point to the fact that vision plays a major part in determining homing behavior. There are various lines of evidence substantiating such an assumption.

We learn, for example, that the ordinary honey bee upon being released, following its removal to a new location, makes an "orientation" flight before setting out upon wider excursions. Some would say that it secures a visual pattern of the landside, preparatory to more extensive flights. Just what actually takes place is unknown. A similar type of behavior was observable in the solitary wasps studied by the Peckhams. They reported that after the wasp had excavated its nest, it made wandering flights over the immediate vicinity. (See Figure 21.) It flew back and forth, circling around and around, presumably establishing a visual pattern by virtue of which it was enabled to make excursions after food and nest materials. The Peckhams found that the removal of objects around or at the nest apparently disturbed the wasps; they were confused in their return.

Rau has more recently studied the homing ability of carpenter and mining bees. He used males and females, both old and young. The males, when tested tended not to return! The big carpenter bees were able to return over fairly long distances. In fact, some established a maximum of 7.8 miles. The smaller (mining) bees could not do so well. Two miles appeared to be approximately their limit of flight. One interesting result of Rau's work was that some bees returned in a short time (20 minutes), while others required more than two days to get back over approximately like distances. Finally, in the tests with old and young, he found that 34% of the old returned, while only 12% of the first-flight bees got safely back. One might explain this fact in terms of (1) a greater flight ability (more strength); (2) the presence of a greater degree of knowledge of the countryside; or (3) the maturing of some "instinct" to-return-to-the-hive. Again, we learn that when bees are liberated over water and over desert regions (McDougall) at a distance less than their normal flight range, they fail to return. They

are presumably unfamiliar with the region. Smith tells us that "birds and insects appear unable to find their way home even when quite near, if from youth or through removal to a strange neighborhood they are unfamiliar with their surroundings" (*45*, 100). Moreover, we are told that bees do not return, if overtaken by dusk, or if they are liberated at night. In such cases, it is extremely difficult to understand how a decrease in the intensity of the illumination could affect any attraction of a tropistic nature which the hive might have for the bees and so inter-

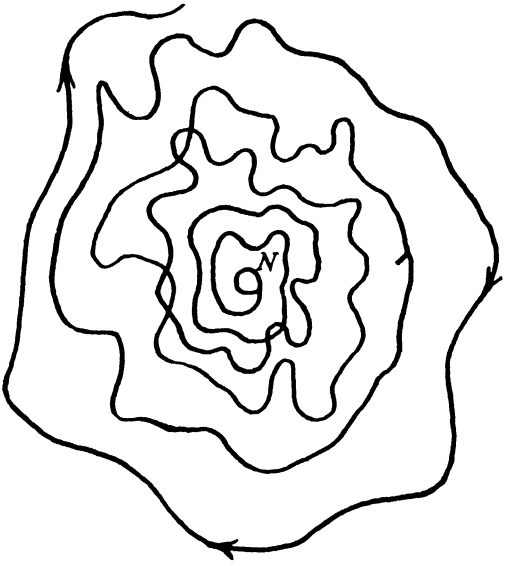


FIG. 21. Diagram of the orientation flight of wasp over region surrounding its nest (N). From Peckhams.

fere with their homing. It may well be, however, that such changes in the illumination deprive the animal of the use of visual cues and so prevent its return.

It is assumed that carrier pigeons in homing employ visual perception to a great extent. Not only are they said to be unable to fly during darkness, but we are told that they do not fly so well in cloudy weather. Furthermore, they clearly show decided improvement under training during which time the radius of their flight range is gradually enlarged. Some students of bird migration also point out that many species apparently draw heavily upon visual perception. They appear to follow river systems, mountain ranges, and coast lines. Some birds seem, however, to make use of other forms of resources. Watson, for example,

found that terns returned from distances altogether too great (around 800 miles) to be satisfactorily accounted for in terms of vision. The birds were presumably guided by cues set up by changes in temperature, direction of air currents, and the like. The problem of homing is, in a way, quite similar to that of migration. They are both very interesting problems and in need of further experimental investigation. At times, one finds such striking cases of homing or migration that it is indeed difficult not to believe in some strange and mysterious power by virtue of which the animal is safely guided. Of all such cases, that of the golden plover is perhaps the most remarkable. These birds each year fly an elliptical and migratory course of approximately 20,000 miles from Argentina to above the Arctic Circle in order, shall we say, to spend sixty or seventy days in the bleak, treeless, frozen wastes of the Northland. Homing, it would appear, represents a most spectacular use of perceptual abilities. We must turn now to consider the problem of memorial ability of animals.

What Is Meant by Memory? Here we deal with the matter of the organism's past. This problem is complicated because there are various ways in which the past may affect an organism. Among these we point out the ways of memory, of perceptual recognition, and of learning. We shall refer to each of these in our discussion of memory. We mean to include under the term memory all those activities in which there is unmistakable reference to the past; that is, where there is clear recall. By recognition we mean that the behavior may be properly interpreted as possessing an element of familiarity without any necessary recall of previous events. We mean by learning that the organism is simply different because of the past; that is, it uses the results of its past, although it may know absolutely nothing of the nature of antecedent events. While we shall not attempt a final answer to the question as to whether the subhuman actually has memory ability like that of the human organism, we do hope to raise here one or two general problems in this connection and to consider them in the light of some experimental results. We shall speak first of memory and learning; later we shall refer to recognition. We shall not find it necessary to go either to one extreme and label as learning all the effects of the animal's past upon its behavior or to the other extreme and consider all changes in the animal as memories. We shall consider some activities as learning and others as memories, although both have to do with the animal's past.

We know that the activities of all animals, even the single-celled organisms, are functionally modified under repetition. We can describe adequately such changes in terms of learning. Hence, we would not

consider any of the modifications set up under repetition as cases of true memories. To do so would mean ignoring the obvious distinction between memory and learning. Before we can call behavior memorial, it must possess characteristics different from those of learning. This means that the perception of some event must be followed after some delay by behavior which can be explained only in terms of the recall of some previous situation or event. Our task here is to get at the antecedents of human activities. We cannot hope to succeed by ignoring proper distinctions. Even the most unthinking among us discover that the human being, for instance, may be tremendously affected by some past event without having any memory of it. We have but to look to our strong prejudices, presumably established in most cases quite early in life, to find very clear evidence of the outcropping of the past without our knowing it to be a part of our past. In many cases, however, we know the particular occasion which produces some change in our lives. We have memories, we say, of it. Now what shall we say of the animal in these respects?

There are many who unquestionably grant memory to the animal. They point out, for instance, that animals react differently to the master's and to the servant's absence, and upon his return the same animals exhibit toward the master, behavior of a wholly different sort from that shown the returning servant. We are told that animals—*e.g.*, dogs and squirrels—bury extra food which they are able to recover from such places. They appear, moreover, to be able to go directly and at once to such sources; that is, they are not forced to rediscover the hidden food by some process of random trial and error.[1] Moreover, dogs have been reported to exhibit considerable excitement upon returning to a place in which they previously found game. They run rapidly back and forth over the general region, evincing more than the usual degree of activity. In a similar way, Morgan cites the case of his dogs which, upon coming to a place where he had previously been forced to render them aid in scaling an obstacle, waited until he overtook them.

Experimental Studies. Köhler points out that his large apes, after a lapse of approximately a day's time, were able to recover food which he had buried in their presence in the sand outside their cages. Although Köhler was careful to avoid leaving any observable visual cues, the apes were not forced to hunt slowly over the area. They ran directly to the spot and scratched up the food. Hunter showed from his study on the ability of animals to delay the execution of an act that rats, raccoons, cats, dogs, and children were able to wait a short time before responding

[1] See Dice (*13*), Frost (*16*), and Klugh (*33*).

and still succeed in securing food. After habituating animals to secure food within a lighted space (See X, Y, or Z of Figure 22), the animal was placed in the starting box and was shown the lighted area in which it might secure food, provided it ran correctly. The light was then turned out, and the animal was restrained in the starting box. After varying periods of delay the animal was released and permitted to make its

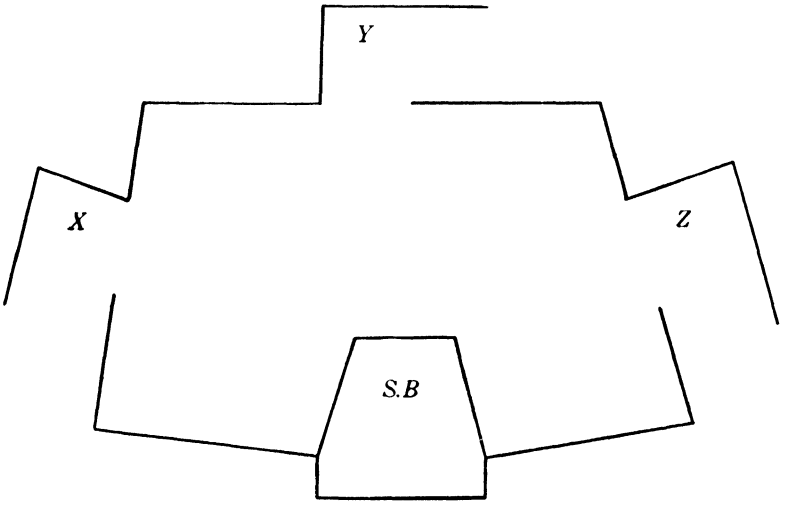


FIG. 22. Diagram of delayed reaction apparatus showing starting box (S.B) and food boxes (X, Y, Z).

choice. Rats, cats, and dogs appeared to orientate themselves toward the food source by pointing their noses in that direction while waiting for a chance to run. Raccoons and children, however, showed a greater degree of "self-sufficiency." They could move about during the period of waiting for release without disturbing the accuracy of their selections. There were, presumably, in their cases intra-organic cues which were not disturbed by changes in bodily positions. These cues were either sensory or imaginal; that is, peripherally or centrally aroused. The evidence seems to point in case of longer delays to some centrally aroused or intraneural pattern, which is released by the perception of the restraining door being opened. The maximum intervals of successful delay, according to Hunter (*26*, 33), are as follows:

Rats	1 to 5 seconds
Raccoons	10 to 25 seconds
Cats	16 to 18 seconds
Dogs	1 to 3 minutes
Child (1 ¼ yrs.)	20 seconds
Child (2 ½ yrs.)	50 seconds
Child (5 yrs.)	at least 20 minutes

In a more recent study, McAllister found evidence pointing to the possible use by rats of some intra-organic cues, although the ability of the rat to delay was no greater than that found by Hunter. Others have shown, however, that dogs are able to obtain food even though they completely change their bodily position during the period of delay. In an opposite view, it is claimed that animals are unable to traverse a given pathway after they have been carried along or forced through it. They must employ their body and legs if there is to be any gain. The assumption in such cases is that if they were able to profit by being put through a task, they would have a memory of the route traveled. Man, we know, may be carried passively along a given pathway and then later, if necessary, be able to traverse correctly the route taken. Thorndike, for example, found that his cats and dogs did not profit from being put through; others have shown that their subjects did. Hunter, for instance, found that the rats, which he had always placed in a box during his period of work, would climb into the box when freed. Raccoons, too, appear to profit, according to Cole, by such handling. Miss Washburn found that rabbits showed much the same sort of behavior within a period of two days, during which time she had repeatedly dropped them into a box for safe-keeping during her experimental period. Other writers point, as evidence of a lack of memory in the animal, to the fact that their subjects were unable to reproduce another animal's performance, which occurred but a short time before in their presence. If an animal observes another member of its species carrying through a certain pattern of movements leading to the securing of food, but remains unable to do likewise when given an opportunity, it probably means, according to such persons, that the animal fails to carry over its observations in the form of memories.

All of these, as well as many other lines of argument have been advanced as evidence for and against the existence of memorial activities in the animal. It would seem that certain of these might rightfully be accepted as evidence for memory in the animal. Others might just as readily be accepted as evidence against the possession of memory. It would appear that some of the illustrations offered as evidence of memory may be adequately explained in terms of perceptual recognition. That is, the animal now sees a particular situation as involving more than the mere spatial features. It is a means or a way of securing food. We have pointed out that man has his perceptions so changed by the way in which he has functioned in the past that he may eventually perceive an object as "calling for" a certain type of behavior without any actual reference to his own past. Applied to the animal it would mean that

the situation, for example, the one in which the dog previously saw the rabbit, now releases heightened activity. Again the perceptual situation involving a place of buried food now means food to the squirrel; hence, when hungry, it runs to the hidden food-source. We can say that the behavior of the creature is different because it previously buried a nut in this place. If we wish to call such a contribution memory, we can, of course, say that the squirrel has a memory of having buried a nut here previously and is now able to recover it. If we wish to say, however, that the animal perceives a situation now as a way of satisfying its hunger, we have perceptual recognition. The problem is essentially one of arriving at the most desirable way of describing the animal's behavior. Everyone grants, we are sure, that the *human* individual behaves differently with respect to certain objects merely because of his earlier perceptions of them; on the other hand, he may, in the total absence of certain of these objects, still experience or verbalize about them. Whether the animal has one or both of these forms of behavior—perceptual recognition and memory—is a question which we cannot attempt to settle finally. The facts are to be used by the student to form his own opinion. We must now turn to consider another form of psychological activities; namely, the imagination.

Imagination. We have reason to believe that a very young child discriminates between its mother's face and that of a stranger, or between its mother's footsteps and those of a stranger. Moreover, we see it become active when the mother approaches with the bottle. Even before the bottle is brought near it, the child's whole behavior pattern undergoes a decided change. We also see it become very active when its cap and coat are brought, or when its buggy is wheeled into its presence. When we turn to the animal we see the dog leap about when the master takes down his gun. We see the cat rub around the feet of its mistress and run with her when the milk pails are produced at milking time; or, we see the horse frisk briskly when the feed basket makes its appearance. Every visitor to the "zoo" has noticed the heightened activity of various animals as the feeding time approaches. What shall we say of all such behavior patterns? There is something more, we believe, in all these cases than what is present to the eye.

There is evidence, it would seem, of a reaching forward in time to include that which is about to happen, or that which is coming. The animal is responding to more than is found in the conditions of extra-organic stimulation. Or, one can say that a part of the whole, original situation now releases a certain type of behavior formerly released only under the whole situation. In all such cases, we believe, the simple

beginnings of imagination may be found. The animal extends the present to include the *about-to-be.* There is a kind of *around-the-cornerness* in this behavior. There is, in short, anticipation. Such extensions are not very great, it is true, and they all probably deal with the future as it is about to afford an opportunity for feeding, mating, securing shelter, and the like. But they are enough to give a hint of that ability which in man is able to extend enormously the boundaries of time; that is, to extend the present to include the thousands of anticipated events of the future.

Emotion in Animals. Do we find behavior of an emotional sort in the animal, or is this form of activity peculiar to man? It is an interesting fact that, with the possible exception of courtship among insects, we have no criteria of emotion which safely lead us to suspect the existence of emotional life in animals below the vertebrate order. Even among the reptiles we have very little indication of what we might safely call emotional behavior. The snake may hiss and spread its head, it is true, but it is questionable whether anger or fear exists. Among the birds we seem to come, however, upon fairly acceptable evidence of the presence of emotional activities. Courtship, which below man probably finds its clearest expression among the birds, seems to involve definite emotions. At least, there are in these animals many changes in bodily functions as well as a wide variety of bodily postures which we may quite properly label emotion.

In mammals, we come upon clean-cut behavioral evidence of emotion. Some excellent studies have been made upon bodily changes in emotion. Cannon sought to determine the physiological changes which take place, for example, in the cat approached by a dog. He points out that when a cat is frightened or angered in this manner, there is, among other changes, a heightened functioning of the adrenal glands which results in the introduction of a greater amount of adrenin into the blood stream of the animal. The effects of the adrenin are shown throughout the whole organism. Sugar is released from the liver; coagulation of the blood is heightened; the heart beat is augmented, and a greater amount of blood is forced into the mechanism of action: the skeletal muscles, the brain, and so on. Experience tells us that the dog which approaches, walking stiffly, his body rigid, his teeth bared, his bristles raised, is an angry dog. It should be understood that we do not mean to raise the question as to whether he feels as we feel when we are angry. We can safely describe his behavior as anger and find comparable activities, under certain situations, among many other animals. The bull, for example, that snorts and bellows, tears up the ground with his horns and feet, lunges heavily at objects about him, may be described as being angry.

The huge ape that bares his teeth, beats his chest until the forest reverberates with the sound, and advances upon an object, may be likewise described as being angry. But the female ape that rushes to a young and feeble ape which falls within her sight and holds it in her arms in characteristic fashion, not too tightly, and so on, is not to be described as angry. Here we say is loving behavior in the same sense that the behavior of human mothers who gently stroke human babies is said to be loving. We find, at least among the higher animals, the emotions of love and anger and fear. Many situations appear to call forth these various forms of activity. We cannot attempt here to enumerate them.

The interesting feature of this glance at the emotional life of animals is the apparent fact that only among the vertebrates do we clearly come upon such behavior. There is very little evidence of emotional life among the lower forms. Emotions are said by some to appear under situations in which instincts conflict. It may be as some maintain that the lower organisms are so nicely attuned that each occasion elicits such definite behavior patterns that no emotion is called forth. The problem is a difficult one to settle. We now leave it to pass on to a discussion of two other psychological activities.

Understanding and Thinking in Animals. Here we come upon a very fascinating aspect of animal psychology. There is one problem which apparently never grows old. Cartoonists draw pictures about it, philosophers speculate over it and psychologists perform experiments upon it. The question is, "Do animals think?" For our purposes, the statement runs somewhat in the following manner, "What antecedents, if any, do we find among the animals of the very important human function of thinking?" As we should expect, there are some outstanding individuals who maintain that certain animals unquestionably understand and think. There are others, however, who strongly insist that animals do nothing of the sort. Let us look briefly at various types of evidence offered on both sides of the question.

Since the time of the early animal studies of Thorndike, it has been argued by some that where the shape of the learning curve shows a regular and gradual decline, it may safely be said that in any situation there is just a slow stamping in of the correct responses without any understanding at all of what the whole problem is about. On the other hand, where we find a very sudden drop in the curve it is argued that the animal now sees through the situation. It understands; or it grasps the essential nature of the relationships. Thorndike found such a regular decline in the curve of learning of his subjects that he was led to believe that there is "no reasoning, no process of inference or com-

parison; there is no thinking about things, no putting two and two together; there are no ideas—the animal does not think of the box or of the food or of the act he has before him." Others, however, have found from the performance of some animals the type of curve which they obtain from human subjects when they suddenly see the solution to a problem and thereafter perform it correctly. Köhler found that his animals—apes, dogs, *etc.*—after fruitlessly attacking a problem in various ways, might suddenly change their mode of behavior and straightway arrive at a solution.

Many of the higher animals appear to possess the ability to bring a period, which has been marked by futile attempts to secure food, to an abrupt end by resorting to a type of behavior that is best described in terms of *understanding* or *insight.* For example, an ape is in its cage, looking through the bars at food. It tries in various ways without success to secure the food. A stick lies on the ground within its perceptual field. Suddenly, the animal seizes the stick and drags in the food. In many of these cases there is a period of delay, during which the animal looks over the situation before it arrives at its solution. This is the period during which thinking is assumed to go on. The experiment just cited illustrates the *tool-using* type of insight. It is prettily represented in the case where food is hung from the top of the cage so that the animal must resort to the use of boxes, in order to secure it. Köhler has made excellent use of this method in his studies of the psychological abilities of apes. He has also used another sort of experiment, that of the *detour* to test the ability of an animal to understand. For example, a dog is placed at *A* (See Figure 23). It sees food at *X* but is unable to reach it. The animal hesitates, turns and dashes straightway along the pathway shown and so secures food.

Some students maintain that animals cannot understand or think because they occasionally perform in a wholly senseless manner. Morgan, for example, cites an experiment in which the skin of a calf was stuffed with hay and presented to the mother. She proceeded to lick it in a truly bovine manner until she had actually produced a hole in the skin; whereupon she calmly proceeded to eat the stuffing of which the calf was made. This was scarcely the type of behavior to be expected of the mother. The mother should have shown more respect for her dead! The results from experiments of a similar nature have led some to maintain that such animals, at least, lack all understanding.

Again we might cite the alleged lack of emotion in the animal at the death or removal of a member of the group. It has been pointed out that the sight of a sick ape will elicit certain forms of behavior from his

comrades which might be termed sympathetic or loving. But as soon as the failing animal is removed so that it is no longer seen or heard, the other members cease to exhibit any evidence that the creature ever existed. They have apparently no understanding of the nature of their mate's physical condition. One is reminded in such cases of a small child which may look upon its dead parent without grief. It may be told merely that its parent has gone on a long journey. There is, we say, no understanding of the nature of its parent's condition.

The Use of Cues by Animals. There is one further line of evidence which we wish to review here. It has to do with the striking perform-

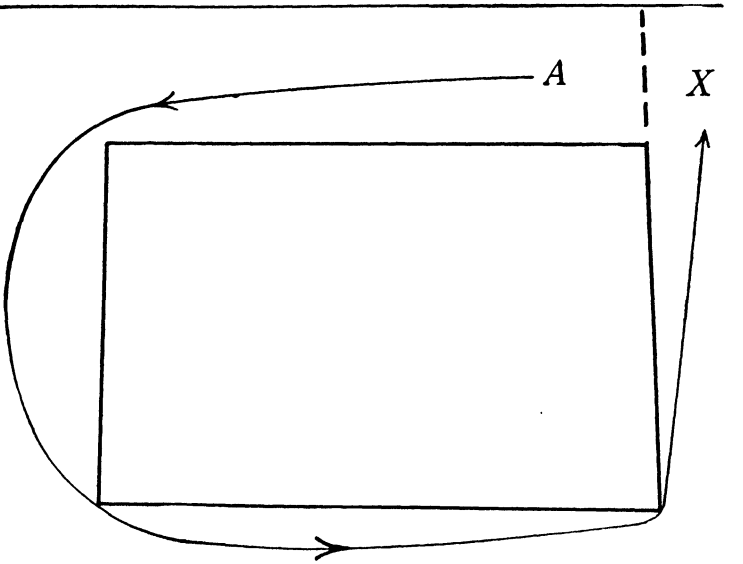


FIG. 23. Diagram of path taken by dog in *detour* studies. An illustration of direct, rather than random behavior. From Köhler, *Mentality of Apes*. By permission of Harcourt, Brace and Company.

ances of the so-called thinking dogs and horses. There is the case of the dog *Dodgerfield* (cited by Thorndike) which was able to bring a card upon which a single number, 1, 2, 3, or 4, was printed. His master had merely to think about the number and order him to "get it." The dog, it was alleged, was able to understand the master so well that he could read his mind. As it actually developed, the dog was exhibiting a very high degree of perceptual discrimination. Although the spoken order of the master was presumably the same, whether he thought of 2 or of 4, there were very slight inflections of his voice which one time released one type of behavior and again another type in the animal. The dog

was able to use very slight auditory cues, and so bring the correct number to his master. The other case of understanding and thinking animals concerns such horses as *Clever Hans*, *Muhammed*, and *Zarif*. We shall confine our discussion largely to the first, but what we say of it is essentially true for the others.

The behavior of the horse, *Clever Hans*, was "carefully" studied by several scientifically trained persons, with a view to determining how the animal could perform so remarkably. But it was left to Pfungst to discover the true nature of the animal's performances. When Pfungst began his study of *Hans* it was generally claimed that the horse was capable of inner speech and thus could count the taps of his foot (in terms of which he gave his answers); that he was quite familiar with the fundamental arithmetical processes; that he could readily read written or printed German; that he had very keen vision and could count the windows of the distant houses; and that he had a mind equal to that of a normal child of 13 or 14 years of age. With all these and many other claims before him, Pfungst began. He found that the horse could respond correctly even when the owner and the trainer were both absent. But he also shortly found that *Hans* could not add, multiply, divide or subtract, unless the questioner or some spectator within the range of vision of the animal knew the answer to the problem given him. For instance, when the experimenter turned his back to the horse and reaching behind pushed aside a number of balls in a box (the number not known to him) the horse failed every time to count them correctly; although sometimes the number was quite small. Neither could he read nor tell the time of day. When cards bearing simple words, or when clocks were shown him in such a way that no one, not even the experimenter, knew the answer to the problem being presented until after the horse had made his calculation, he generally failed. He was able to solve approximately ten per cent. When the questioner, however, knew the answer, his accuracy was as high as 98 per cent. The ten per cent reported correctly was to be explained partly in terms of chance, and partly in terms of an assumption that in some cases, at least, there had been a sufficient degree of training on some problems to secure a kind of habituated performance. The animal had simply learned to paw so many times to a few situations.

The large percentage of correct responses, when the questioner knew the answer, is to be attributed to the ability of the animal to use such visual cues as very slight head movements of the questioner. These movements were so slight that they were not perceived, either by the various experimenters or by the spectators, until Pfungst made his

study. The horse, then, did not think; it merely perceived and pawed. Human beings unconsciously gave the animal the cue to the solution. There were certain characteristic features of the animal's behavior which tended to show that it was really responding to such human cues. Among these we wish to point out that the animal made errors: (1) when the questioner computed correctly but did not move at the proper moment to cue the horse, (2) when the questioner made a mistake in computation, and (3) when the number shown the horse differed from that shown the spectators. Let us illustrate the last. The experimenter wrote a number such as 1 + 6 on a slate. He then showed this to the spectators, groom, stable boy, and so on. But as he turned to show it to the horse he added a stroke so that it was now 7 + 6. The horse replied in terms of the problem, 1 + 6. Moreover, the horse appeared to need no more time for the difficult than for the easy problems. Finally, the animal did not appear to scrutinize the problem carefully as the human individual would have done. He immediately started to paw out his answers.

Now all these studies upon so-called thinking animals have made clear one very significant fact; namely, that some animals are not only capable of remarkably keen perceptions but they are also able to link up these perceptions with behavior in a comparatively short time. It is of considerable psychological interest that a dog or a horse should be able to make use of such cues as determiners of behavior. Even if they cannot *think*, they show striking evidence of the degree to which certain of the psychological abilities may be developed. When we consider performances such as these, the ordinary stage tricks of animals which are usually initiated under gross bodily movements of the trainer become quite simple affairs.

So far in our discussion of animal psychology we have not said anything about certain alleged forms of behavior, to a consideration of which many writers devote a great deal of space. So far we have not raised the problem of such things as reflexes, tropisms, instincts and habits. We cannot leave this field of the psychology of the animal without some mention of these "types" which are held by many to be fundamental forms of behavior.

REFLEXES, TROPISMS, AND INSTINCTS

There are many ways of classifying animal behavior. Following some we might set our classes in terms of purpose. Thus we would have behavior exhibiting varying degrees of purposiveness. That is to say, some animals strive more than others toward some conscious goal.

ırposive behavior presumably exhibits certain characteristic features. :cording to McDougall, who has most clearly defended this position, e more outstanding features are as follows: (1) a certain spontaneity movement, (2) the persistence of activity independently of the con- ıuance of impressions which initiated it, (3) variation of direction of e persistent movements, (4) the coming to an end of the animal's ovements as soon as they have brought about a particular change in ı situation, (5) preparation for a new situation toward the production which the action contributes, and (6) some degree of improvement in e effectiveness of behavior when it is repeated by the animal under nilar circumstances. We must unquestionably grant that we find ch behavioristic characteristics as these. But whether they are in- :ative of consciousness or whether they may be interpreted as evidence animal purposiveness or striving is a matter into which we cannot ı here.

Again, we might classify behavior with respect to the time at which e neural conditions for it were established. Such a mode of classifying ɔuld give us our "innate" and "acquired" forms. Of the former we find ree general sorts discussed in the literature; *viz.*, reflexes, tropisms, and ɜtincts. Different writers tend to stress one or more of these three :ms. Watson thus stresses reflexes; Loeb emphasizes the tropisms; and cDougall inclines strongly to instincts. We shall briefly consider each these three. We shall then say a word about the "acquired" forms of havior.

Reflexes. The reflexes are commonly defined as the movement, or ındular activity, of some part of the body, usually not a large part, ɔduced through the operation of a small portion of the nervous system. e are all acquainted, for example, with the pupillary reflex, the patellar, d the wink reflex in the human being. It is undoubtedly true that the :al stimulation of some bodily region may result in a fairly well- fined and precise movement of a part of an animal. It does not mean, wever, that this behavior under normal conditions is produced by ıall independent units of the nervous system; that is, by pathways ıich are entirely independent of all others. We recognize in this con- ction that the mere clenching of the hands or the clamping down of e teeth will have its effect upon the total excursion of the leg in the ee jerk. It means that such a thing as a simple independent reflex in reality an *abstraction.*[1]

[1] We can do no better than to quote Sherrington in this connection. "There is : co-ordination which a reflex action introduces when it makes an effector organ ponsive ' ɔ excitement of a receptor, all other parts of the organism being supposed

According to some, all behavior of human and animal organisms, when properly analyzed, consists essentially of simple reflexes. Usually they are compounded, or chained together, under life situations to give the highly complex forms of animal and human behavior. Thus instincts, for some, turn out to be chained reflexes; *i.e.*, a series of movements each of which is initiated by the preceding. Moreover, reflexes are automatic. If the stimulus is applied, the movement must follow. Its occurrence is comparable with the chemical reaction produced by the introduction of a simple reagent into some compound. Furthermore, reflexes may run their course even when the brain of an animal, or for that matter human being, has been "cut off" from the spinal cord. Decapitated chickens will quickly withdraw their feet from hot water. The spinal snake will twine "calmly" around a red-hot poker; or dead (?) for hours, it will still twist under stimulation. The spinal dog will move about, but it presumably knows no hunger and no fatigue. We know that many of the bodily functions of the human being are sustained in terms of the automatic functioning of the lower centers of nervous control. It has been pointed out that a woman lacking all organic sensitivity because of spinal injury may still go through all the bodily operations of giving birth to a child, without realizing what is taking place. And we recognize that under complete unconsciousness the bodily functions of respiration, circulation, and digestion continue uninterruptedly.

According to McDougall, however well the reflex may conserve the organism under certain conditions, it still lacks the essential element, or touch, of true behavior; that is, it is not purposive. He maintains therefore that reflex behavior is not only highly stereotyped, but that it lacks the persistence of behavior as found in the normal individual. Moreover, the reflex at no time shows either any preparation for anticipated events or improvement under repetition. It does seem, however, that in many cases, a fairly adequate description of an animal's behavior may be given in terms of the movements elicited wholly under stimulation of spinal centers. If a spinal frog, for example, is suspended

indifferent to and indifferent for that reaction. In this grade of co-ordination the reflex is taken apart, as if separable from all other reflex actions. This is the *simple reflex*. A simple reflex is probably a purely abstract conception, because all parts of the nervous system are connected together and no part of it is probably ever capable of reaction without affecting and being affected by various other parts, and it is a system certainly never absolutely at rest. But the simple reflex is a convenient if not a probable fiction. . . . A reflex reaction, even in a "spinal animal" where the solidarity of the nervous system has been so trenchantly mutilated, is always in fact a reaction conditioned not by one reflex-arc but by many. A reflex detached from the general nervous condition is hardly realizable" (*61*, 7 and 115).

by its lower jaw and a drop of acid is placed upon its side, its hind leg on that side will come up and make "wiping" movements. If this leg is removed, the animal, after a moment, will bring the other hind leg across and wipe at the spot irritated. If this action is in turn prevented, the animal resorts to the use of its forelegs. In such cases as these a certain degree of variety and persistence of movement is demonstrated that might very well be interpreted, if one were so inclined, as purposeful. McDougall, however, would be reluctant to admit as much, since the brain is in no way concerned in these activities.

A great deal of very valuable work has been done with the animal in connection with the extension of the reflex by way of the so-called method of conditioning. Since Pavlov published his classical investigations upon the salivary reflex, many studies have been made upon the discriminatory abilities of the animal using the amount of saliva produced as the criterion of discrimination. It would appear that, to some, the method of the conditioned reflex may be regarded as the key to "most of the riddles of the universe, or at least as the master key of human fate."

Tropisms. The reflex, as it is commonly interpreted, involves a *nervous mechanism.* It is muscular or glandular activity released under the influence of a nervous impulse aroused in some set of receptors. But there are a great many forms of animal life in which there is no true nervous system. What shall we say of their behavior? Here we come upon the concept of the tropism as developed originally by Loeb and widely held under various meanings by many biologists. Loeb was led to formulate the theory from his observations upon the activities of certain plants under various forms of stimulation. He found, for instance, that some plants turn toward the light, others grow toward water, and still others grow toward the earth when suspended above it. He also believed that the lower organisms respond to the source of stimulation in very much the same manner; that is, in a simple, direct, irresistible and automatic way. Such animals, so Loeb interpreted, respond to their effective environment as immediately and as inevitably as a chemical responds to a reagent. He writes as follows:

> These tropisms are identical for animals and plants. The explanation of them depends first upon the specific irritability of certain elements of the body surface, and second upon the relations of the symmetry of the body. Symmetrical elements at the surface of the body have the same irritability; unsymmetrical elements have a different irritability. Those nearer the oral pole possess an irritability greater than that of those near the aboral pole. These circumstances force an animal to orient itself toward the source of

stimulation in such a way that symmetrical points on the surface of the body are stimulated equally. In this way, animals are led without will of their own either toward the source of the stimulus or away from it.

A very pretty illustration of the orientation movements of an animal with respect to a light source is seen in the so-called "circus" behavior of animals. A bilaterally symmetrical animal that is positively phototropic may be functionally deprived of one eye. As the stimulus acts upon the one good eye, the energy flows out chiefly to the muscles on one side of the animal. These contract more vigorously than those on the other side, thus swinging the animal in a circle in much the same way as too much force applied to one oar will cause a boat to swing in a circle. If a creature, treated in this way, is put at one end of a pole with a light source at the other, it will move toward the light by circling *around* and *around* the pole. Animals are attracted or repelled, according to this theory, in a way comparable to the action of a magnet upon a bit of iron. We should recognize, however, that an animal, even a protozoan, may respond in a varying manner to the same physical stimulus or situation. The intra-organic state serves, so it would appear, to determine in many cases at least, whether the animal shall react the one way or the other.

While there is undoubtedly a great deal of truth in the tropistic statement that animals may respond in fairly definite ways under certain fairly definite situations, it must not be considered as entirely adequate. The primary factor operating against the predictive value of a tropistic way of regarding behavior is the physiological state of the organism. For a change in this may completely change the nature of the response. Watson (*72*, 100), for instance, remarks that we must be careful "not to over-emphasize the concept of invariability and predictability, since depending upon the physiological state of the organism we find, in extreme cases, the situation where a stimulus which at one time produces positive responses, may under other conditions, produce negative responses; *e.g.*, when the frog is in a temperature of 10°, it is positive to light, below 10° negative."

There is unquestionably an element of indeterminableness about animal behavior which tends somewhat to mar the otherwise straightforward account of a tropistic description. This is to be taken to mean that the animal is an organism, which is constantly adding to its history. Its past serves, by way of changed organic state, to modify its present behavior. We do not mean that the indeterminableness is to be attributed to any mysterious factor. It means that the animal's behavior is less determined at times, by the extra-organic conditions of the stim-

us and more by the intra-organic state. The animal may respond in certain way to a stimulus and then, because of modification through ırning, respond differently. In terms of the tropistic explanation, it ould continue to respond in the old way. The animal varies its be-.vior under the same stimulus conditions. It exhibits a type of be-.vior which is labeled by some as "trial and error," and in terms of ıich we are provided with a way of regarding the animal that allows r some degree of improvement in behavior. The future of the animal, cause of its past now actually holds out something different for it. ıt in terms of tropisms, there can be no modification through learning cause there is a very high degree of rigidity in behavior. Among the ɔre outstanding biologists who stand distinctly for an intra-organic termination of animal behavior is Jennings. Jennings, who has given a great deal of information concerning the activities of lower organism, s consistently maintained that an adequate description of the con-:ions of behavior, even of the simplest forms, cannot be written solely terms of the conditions of stimulation. The animal does not re-atedly respond in a simple stereotyped manner to the same stimulus. may respond rather in a variety of ways, by virtue of changes in its :ernal state.

Classes of Tropisms. There are essentially two ways of classifying ɔpisms. We may classify them either in terms of the character of the ɜponse, that is, with respect to the direction in which the animal moves th regard to the source of the stimulus. This gives positive tropisms which the animal moves toward, and negative tropisms in which the imal moves away from the source of stimulation. Or, we may classify ɜm with respect to the stimulus; that is, whether it is chemical, photic, ɜrmal, or tactual. This classification gives us such responses as ɜmotropism, phototropism, and thigmotropism. Let us consider these.

Phototropism. An animal, such as a night-flying moth, is negatively ototropic to sunlight. But it may be positively phototropic to weak ht of an arc lamp, a candle or a match. Bees are supposed to become sitively phototropic at swarming time. In this way they are brought t of the hive. Ants at the time of the nuptial flight, may issue from ɜir dark earthy caverns and take to the bright sunlit air. Following ıting, they break off their wings and become negatively phototropic. ɜre we find a striking dependence of the functioning of the total or-nism upon some particular bodily member. If the wings of such ant ms are removed before the nuptial flight, their whole bodily metabol-ı appears to undergo a change with a resultant change in behavior. ithout passing through the nuptial flight, they become negatively

phototropic. Some insects are positively phototropic upon emerging from the egg-state; but upon eating they may immediately become negatively tuned. Loeb performed a very striking experiment upon some insect larvae (Porthesia butterfly). He placed the animals into "a glass tube the axis of which was at right angles to the plane of the window. The caterpillars went to the window side of the tube and remained there, even when leaves of their food plant were put in the tube directly behind them." Under such conditions the animals actually died from starvation, the light preventing them from turning to the food, which they eagerly ate, however, when the light allowed them to do so. We cannot say that these animals were attracted *by the light*, since "it can be shown that they go towards the source of the light, even if in so doing they move from places of a higher to places of a lower degree of illumination" (*42*). This simply means that they will move through shadows in order to approach nearer to the source of stimulation.

Chemotropism. But the animal may orient itself with reference to a source of chemical stimulation. It may turn toward or away from some chemical agent. Certain animals are supposed to mate, secure food, lay eggs and the like, chemotropically. The animal mates, in these terms, not because it wants to, but because it is blindly driven, among other factors, by the odor of its mate. The house fly, in tropistic terms, is literally forced because of the power of the chemical stimulus to deposit her eggs in certain regions.

Thigmotropism. Here the animal seeks to assume a position such that some or all parts of its body are either in touch with other objects or quite free from all objects. It may be a form of thigmotropism that causes cattle to crowd together; or to become restless when not in contact with others of their kind. The earthworm, if given an opportunity, appears to be less restless when lying against other objects than when in the open. It is positively thigmotropic.

There are many other kinds of tropisms but we cannot consider them here. The principle, we feel is made clear. It is that of forced movements in which the animal automatically orients itself to the center of stimulus source. It is mechanical response to some precise physical or chemical agent. On the whole, it is a thoroughly fascinating attempt to get at the foundations of animal behavior. To some it is a valid way of viewing all behavior, human and animal. McDougall, who opposes this theory, in discussing the problem of the sufficiency of the tropistic explanation, writes as follows:

> It is worth while to reflect that if a monstrous visitor from another planet were to study the behavior of a colony of human beings through a powerful

agnifying glass he might well come to the conclusion that human behavior largely, if not wholly, a matter of tropic reactions. For he would observe at if they are fatigued by a day's activity they become negatively photo-opic, seeking dark places and lying quietly there; but after a period of rest e sign of their tropism is reversed, so that they become positively photo-opic and seem to seek the light. He would observe that in cold weather ese queer creatures become positively thermotropic and congregate about es and stoves; and that, when they are hungry, they become positively emotropic toward the chemical substances which diffuse themselves from e cook-house door. He might observe also that the males tend to congregate out young females; and, if he were a mechanist of the school of Loeb, he ould confidently infer that the young female emits some unknown form of diant energy towards which the males are positively tropic (*45*, 63).

To other writers, the explanation is valid as applied to the activities the lower forms but not to the higher. To some it is not adequate en for the lower forms. Finally, we find some who would apply the inciple of the tropism to the lower animals and the principle of instinct the higher animals. The latter forms do not respond tropistically; ey respond instinctively. We must turn now to consider briefly the ture of the instinct or the third type of so-called innately determined havior.

Instincts. What is instinct? We may say quite frankly that it is possible to give a definition that will even begin to hold for all individuals in the field. There are many widely differing ways of considering instincts both among scientists and non-scientists. One has but consider the list of instincts compiled by Bernard from many writers realize that it is no simple matter to define instinct or to say simply at "I believe in instincts."[1] Some consider instinct in terms of the imulus situation in much the same way as the tropism is considered terms of the agent which releases it. Thus, if a coyote howls all night the spring, it is instinctively calling to its mate. Again, if the same imal howls at night after a mate has been killed in the vicinity, it is stinctively mourning its loss. For others, instinct is to be considered terms of the end subserved by behavior. If a bird carries food and ores it, we have the collective instinct or perhaps the self-preservative stinct. If the bird carries food to its young, it is a racial or a maternal stinct. To still others, instinct must be considered in terms of the ural conditions of behavior. It now becomes a hypothetical or inential nervous pattern determining the course of activity. It is the

[1] Some of the instincts listed are as follows: altruistic, anti-social, disgust, economic, hetic, ethical, family, fear and flight, food, social, intellectual, emulative, migratory, y, religious, self-assertive, self-display, sex, workmanship.

dead hand of the race laid upon the individual. Finally, instinct may be generally defined just "in terms of behavior." It now becomes a complex form of innately determined behavior released under highly specific conditions of stimulation. Each writer has his own pet view of instinct. His own way is felt to be the right way.

Now why can't we be sure about the nature of the various alleged instincts? Why can't we separate instinct from tropisms, and so make it impossible for one to confuse tropisms with instincts? Why can't we separate instincts and reflexes; or instincts and intelligence; or, finally, instinct and habit so that we can positively say that this particular bit of activity is either instinct or habit? Or, at least, say that this behavior is so much instinct and so much habit? Here we come sharply face to face with a realization of the true nature of instinct. We can see that the confusion arises largely from the simple fact that no one has ever observed an instinct; nor has one ever observed tropisms, reflexes, intelligent acts or habits in the sense that these terms are almost universally used. Such terms are generally interpretative. They are explanations of functional events. No one, we must say, ever observed interpretations or explanations.

No one is able, no matter how closely he may observe the activity of an animal at any given moment, to distinguish, for example, an instinct from a habit. Consider for a moment the following illustrations. Does a young chicken instinctively or habitually follow the hen? Many may say, "How perfectly foolish!" All one need do is to go out and see thousands of little chickens following hens without being taught to do so. It *is* instinctive. But we know that a chicken will follow a *man, cat, dog* and *not* a hen, provided it has secured food under certain situational conditions in which one of these has been an essential factor. Again, we know that if the chick does not early secure food in connection with some moving object, it will not "follow" at all. But if it has been given food for a time along with such an object, it will then follow. It seems safe to say that under ordinary conditions the young chick, from the time of its emergence, sees its "mother," hears her clucking and secures food. The sight and sound of the mother are very quickly tied up with feeding. As the chick grows older its food capacity increases to a place where the mother is unable to supply all mouths. It ranges more widely in search of food. And being successful, it gradually severs the earlier dependence upon the mother. It ceases to be responsive to its mother's call! When its mother clucks it does not run. She, in turn, gradually ceases to cluck; and, instead of giving the food to the chick she eats it. Thus, we do not have to postulate an instinct on the part

of the chick to account for its separating from its mother, any more than we have to assume an instinct for following its mother. Neither do we have to postulate a "hard-hearted" instinct on the part of the mother, by virtue of which she casts off her progeny and refuses to look after them.

The whole serial process, in such cases as these may be put, we believe, in terms of *supply* and *demand*. All we need assume here is the existence of hunger, together with the ability to perceive, to be satisfied, and to be modified by such events. If one has seen a falcon, one of the most savage of predatory birds, hopping docilely along behind the master, who feeds it when it is hungry, one must have been deeply impressed with the futility of trying to reduce the major portion of the behavior of the animal to certain predetermined or strictly innate modes of activity. We do not mean to say that all cases of "instinct" may be reduced in this manner to habituation under the need for food. There are other needs, as we have said, in terms of which others would explain much of the animal's behavior.

Instinct and Habit. Instinct and habit refer to the time at which the neurological conditions underlying a particular behavior pattern were established; or to the time at which certain behavior patterns appear. In other words, they refer to two different ways of establishing the neural conditions of body activity. The one is by way of racial contribution through heredity; the other is by way of individual acquisition under repetition. If we consider action *descriptively* and *individually* we never discover instincts. If we were to take one individual and study it over a fairly long period, we *might* find evidence of the existence of a great many forms of innately determined activity. But these would not necessarily be "instinctive." They might all be, let us suppose, startling cases of abnormalities.

Instincts refer to activities common to large numbers. One finds a particular bit of behavior happening again and again in a particular animal as well as in other members of the same species. One infers that it could not possibly have been learned. It may then be called instinct. Instinct is a name given to recurrent behavior patterns under specific conditions both inside and outside of the organism. But instinct regarded in this way loses its value for most individuals, for it does not motivate behavior. Neither does it control the individual's behavior. It serves in no way as a cause of further behavior—it is a term which simply refers to the fact that some action, presumably innate and characteristic of a group, occurs in this individual. What is true of the instinct holds also for habit. Habit refers to a single individual. For example,

if we see a man smoke today, yesterday, and the day before and we find that it is neither common to the species nor, presumably, innate, we say the man has a *habit* of smoking. This *habit* of smoking, *considered in this manner, as a particular behavior pattern*, which is like or different from smoking patterns in others, in no way *affects* future behavior of the individual. It does not, at any time, cause him to smoke. Neither does it (as habit) decrease or increase his efficiency. It is simply a way of denoting the fact that this man did something yesterday, the day before and so on. Habits and instincts then are historical terms. They refer to the fact that a particular behavior pattern has had a certain history, and therefore must belong to a certain general *class* of activities.

Some view instincts as constituting a dynamic driving force back of all behavior. They serve as motives or incentives to activity. When they are thwarted or interfered with, perversions, distortions, conflicts, and the like appear. Moreover, the course of each (major) instinct is usually regarded as being characteristically colored by a particular emotion. With the pugnacious instinct there is anger; with the instinct of flight there is fear, and so on. We are told that there is a tremendous reservoir of organic energy within the individual which may be tapped under proper intra-organic and extra-organic conditions. The key which actually serves to release this energy is the objective situation which arouses an instinct. The song and the courting behavior of the male bird, for instance, is the key that unlocks the mating instinct in the female bird.

Instinct and Emotion. McDougall stresses the above point. We quote from him:

> Among the birds, then, there are three principal kinds of sense-impression by means of which the male evokes in the female the train of instinctive behavior which culminates in her submission to impregnation by him; the vocal display, the display of plumage, and the display of antics. In all cases the display involves some activity on the part of the male; and in many species as notably among the pigeons, the male is active in all three ways: he struts and bows and spreads his tail; at the same time he swells his breast, and from time to time coos in the manner peculiar to the occasion. The female is prepared by nature to be affected in a specific manner by these displays of the male; they normally evoke in her the submissive attitude and behavior which are her instinctive rôle in the business of pairing, but not suddenly and fatally; her response is as unlike the knee-jerk or the scratch-reflex of the dog's hind leg as any action well could be; it exhibits all the marks of behavior in the highest degree. Only after many hours or days of active courtship by the male, does she at last yield to him. The peacock's tail or the nightingale's song may be called the "stimulus" to the pairing instinct of the female; but,

if we so describe it, we are using the word in a sense very different from the physiologist's usage as we might speak of the stimulus that comes to a man from a great example, from an ideal, from prizes, or from rivals (*45*, 97).

It would appear that observation and logic would force one to grant that there are behavior patterns in the animal which may properly be held to be common, generally speaking, to a large number of animals; which are highly *utilitarian* in character; and which issue from some fairly definite organic basis. We do not raise the question as to whether these patterns are innate or acquired, inasmuch as we shall assume that they are the products of both heredity and environment. Some persons seem to feel that the more outstanding types of behavior, by means of which the organism survives, must be largely or wholly attributed to fairly specific innate neurological patterns. Such persons prefer to say that those animals, which have been discovered living in complete freedom from all predatory organisms, and which at first show absolutely no fear, later flee at the sight of man because of instinct. They assume that the instinct has lain dormant within the animals for untold thousands of years. The appearance of man among them is signalized after a time by the revival of the long-buried instinct. To admit that the animals might learn to move away at the sight of man would mean the granting of too much credit to the animal. In terms of their behavior, however, one might actually contend that these animals which do not at first fear man are *instinctively* unafraid of man. Later they become afraid. One could also maintain that such creatures have a *delayed* instinct to fear man; that is, it does not show at first.

On the whole, it seems that we may safely say that animals select, reject, discriminate, in a great many cases, partly in terms of some general, organic tuning. It probably means that the creatures which belong to a given species are composed essentially of *like protoplasm*. And, generally speaking, they have had a *like history*. Because of these two antecedent conditions, their behavior patterns are similar. We need but go to animals and observe their movements for a while to discover evidence of common ways of behaving. Thus we see and hear among closely related forms, characteristic movements and sounds, in such activities as sucking, pecking, scratching, drinking, mating, care of young, migration, submitting to enemy or mate, stalking prey, depositing eggs and so on. The facts of bodily movement are not to be questioned, but we must not be hasty or misled by theory in our interpretation of them.

The Acquired Forms of Behavior. And now, as a final word upon the psychology of the animal, we turn for a brief moment to consider

the acquired forms of behavior. Generally speaking, we seem safe in inferring, from the experimental evidence at hand, a certain degree of educability in all animals, for even the simplest animals, the protozoa, appear to function differently because of their past. Again, when one leg is removed, the dog which has always had his four legs at his disposal gets about on three. The same species of birds shows wide variation in different localities in the sort of nest material used. Moreover, Conradi, showed that the song of some sparrows, reared with canaries, was quite different from that of other sparrows which had had a different history. These canary-trained sparrows when placed with other members of the species took on somewhat the character of the latter's song, but they never wholly lost the effects of their earlier education. The cockroach, which seems under certain conditions decidedly to prefer dark places, was educated by Szymansky so that it was apparently afraid of the dark. It had been *shocked* so often in the dark that it would turn away from such places. And when we find the huge lion opening his mouth at his master's bidding so as to allow the head of the master to be inserted and safely removed, we begin to appreciate the enormous differences to be found among members of the same species under different environmental conditions.

These illustrations, as well as many others of a quite similar nature, raise an interesting point. Are we justified in saying, as so many do, that the instincts of such animals have been greatly modified under these conditions? One hears that the dog has an instinct for walking on four legs; that the bird has an instinct to sing in a certain manner; that the cockroach has an instinct to seek out dark places, and the lion has an instinct to kill man. All these animals have such instincts, we are told, because "in the wild" or in a "natural" state they do these very things. But we must ask by what right we are to assume that the animals "in the wild" are more *natural* in their behavior than are the animals brought up under less "wild" conditions. It would appear much better to assume that the "wildness" is in man's way of thinking. The country is not wild to the animals, for example the lions, brought up in it. We cannot rightfully assume because such animals grow up under "natural" conditions (do we know what "natural" conditions for an animal are?), that they are *unmodified.* That is to say, their instincts are to be found in all their pristine clarity. If all lions were brought alongside of man, we would probably have a totally different notion concerning their so-called instincts. They might retain their present structure, but we are sure that functionally regarded they would be wholly unlike the present species.

We must agree, then, that the environment is always effective; and that it is impossible to think correctly of the behavior of an individual or of a species unless we recognize that we refer to creatures set down within a particular environment. The lion brought up in a circus is a certain creature with a certain history. And unless we believe in some *hypothetical, common,* or *average* lion we cannot possibly say that the lion's instincts have been modified or changed through learning. It is a product of a set of conditions in which an environment of a particular sort has played a *very necessary part.* And it seems wholly unnecessary to assume that any *man-killing, rapacious* instincts have been *suppressed, inhibited* or *modified.* In fact such an assumption belittles the part which the environment plays as a determining factor in individual development. *The animal "in the wild" is different from his blood brother in the circus because each has had a different history.*

Now, it is claimed that if a pet lion, for instance, were put out in the open, he would *revert.* We hear the same said of calves, hogs and dogs which have developed independently of man's influence. But reversion, we must point out, implies the notion of some *hypothetical, average,* or *natural* animal—some standard creature. We grant without question that a circus (performing) lion, for example, placed under conditions in which it was no longer petted and provided with food would become restless, move about and finally attack other animals as a source of food; much in the same manner as man, who, under the dreadful urge of utter hunger, has been known to attack and to eat his own kind. But it is wholly unnecessary for us to assume any instinctive reversions in the animal, or for that matter in the human being. We need merely to assume that an animal, or human organism, is capable of changing its behavior under a change in environmental conditions. That is, that it is able to act differently under new conditions. Animals, we say, are different functionally because of a difference in habitat. They are bits of protoplasms functioning under certain environmental conditions. The environment is just as important as the protoplasm. Under one set of conditions we obtain one sort of animal; under another set of conditions, we find a wholly different animal. Whether a creature has its "instincts" modified; or whether its behavior reflects unmodified "instincts" is an extremely difficult but important problem for the student of the animal.

BIBLIOGRAPHY

1. Bernard, L., *An Introduction to Social Psychology.* 1926.
2. Bethe, A., "Duren wir den Ameisen u. Bienen psychische Qualitäten Zuschreiben?" *Pflügers Arch.,* 1898, *70,* 15.

2a. Bovard, J., "The Function of the Giant Fibers in Earthworms." *Univ. of Calif. Pub. in Zoology*, 1918, *8*, 135–144.
3. Breed, F., "The Development of Certain Instincts and Habits in Chicks." *Behav. Monog.*, 1911, *1*, 1.
4. Cannon, W., *Bodily Changes in Pain, Hunger, Fear, and Rage.* 1915.
5. Carr, H., "The Interpretation of the Animal Mind," *Psychol. Rev.*, 1927, *34*, 87–106.
6. ———, and Watson, J., "Orientation in the White Rat," *J. of Comp. Neurol. and Psychol.*, 1908, *18*, 27–44.
7. Child, C., *The Origin and Development of the Nervous System.* 1921.
8. Claparêde, E., "Les chevaux savants d'Elberfeld," *Arch. d. Psych.*, 1912, *12*, 263.
9. Cole, L., "Concerning the Intelligence of Racoons," *J. of Comp. Neurol. and Psychol.*, 1907, *17*.
10. Conradi, E., "Song and Call Notes of English Sparrows When Reared by Canaries," *Amer. J. of Psychol.*, 1905, *16*.
11. Craig, W., "The Expression of Emotion in the Pigeon," *J. of Comp. Neurol. and Psychol.*, 1909, *19*, 29–80.
12. Dashiell, J., "A Quantitative Demonstration of Animal Drive," *J. of Comp. Psychol.*, 1925, *5*.
13. Dice, L., "How Do Squirrels Find Buried Nuts?" *J. Mammal.* 1927, *8*.
14. Fields, P., "Form Discrimination in the White Rat," *J. of Comp. Psychol.*, 1928, *8*, 143–158.
15. Frisch, K., v., "Das Problem des tierischen Farbensinnes," *Die Naturwissenschaften*, 1923, 11.
16. Frost, E., "Behavior of a Gray Squirrel," *J. of Animal Behav.*, 1913, *3*.
17. Haenel, H., "Neue Beobachtungen an den Elberfelder Pferden," *Zeit. f. Angew. Psychol.*, 1914, *8*.
18. Herrick, C., "The Evolution of Intelligence and Its Organs," *Science*, n. s., 1910, *31*, 7–18.
19. ———, "Some Reflections of the Origin and Significance of the Cerebral Cortex," *J. of Animal Behav.*, 1913, *3*, 222–236.
20. ———, *Brains of Rats and Men.* 1926.
21. ———, *Neurological Foundations of Animal Behavior.* 1924.
22. Hicks, V., and Carr, H., "Human Reaction in a Maze," *J. of Animal Behav.* 1912, *2*, 98–125.
23. Holden, F., "Effect of Starvation upon Behavior by Means of the Obstruction Method," *Comp. Psychol. Monog.*, 1926, 1–45.
24. Hunter, W., "Delayed Reaction in Animals and Children," *Behav. Monog.*, 1912, 2.
25. ———, "The Question of Form Perception," *J. of Animal Behav.*, 1913, *3*, 329, 333.
26. ———, *General Psychology.* 1919.
27. Jenkins, T., Warner, L., and Warden, C., "Standard Apparatus for Study of Animal Motivation," *J. of Comp. Psychol.*, 1926, *6*, 361–382.
28. Jennings, H., *Contributions to the Study of the Behavior of Lower Organisms.* 1904.
29. ———, *Behavior of Lower Organisms.* 1906.

30. Johnson, H., "Visual Pattern Discrimination in Vertebrates," *J. of Animal Behav.*, *4*, 319–361; *6*, 169–221.
31. Judd, C., *Evolution and Consciousness*," *Psychol. Rev.*, 1910, *17*, 77–97.
32. Kirkpatrick, E., *Fundamentals of Child Study.* 1919.
33. Klugh, A., "Ecology of the Squirrel," *J. Mammal.*, 1927, *8*, 1–32.
34. Koffka, K., *The Growth of the Mind.* 1925.
35. Köhler, W., *The Mentality of Apes.* 1925.
36. Kreidl, A., "Über die Schallperception der Fische," *Pflügers. Archiv.*, 1895, 61.
37. Kuroda, R., "Experimental Researches upon the Sense of Hearing in Lower Vertebrates," *Comp. Psychol. Monog.*, 1926, *3*, 1–50.
38. Lashley, K., "Visual Discrimination of Size and Form in the Albino Rat," *J. of Animal Behav.*, 1912, 2.
39. ————, "The Color Vision of Birds," *J. of Animal Behav.*, 1916, *6*, 1–26.
40. ————, and Ball, J., "Spinal Conduction and Kinaesthetic Sensitivity in the Maze Habit," *J. of Comp. Psychol.*, 1929, *9*, 71–101.
41. Loeb, J., "Concerning the Theory of Tropism," *J. of Exper. Zool.*, 1907, *4*.
42. ————, *The Mechanistic Conception of Life.* 1912.
43. ————, *Forced Movements, Tropisms and Animal Conduct.* 1918.
44. McAllister, W., *Delayed Reaction in the Albino Rat* (Doctral Thesis, 1929).
45. McDougall, W., *Outline of Psychology.* 1923.
46. Morgan, C. L., *Introduction to Comparative Psychology.* 1894.
47. ————, *Animal Behavior.* 1900.
48. Moss, F., "Study of Animal Drives," *J. of Exper. Psychol.*, 1924, *7*, 165–185.
49. Parker, G., "The Sense of Hearing in Fishes," *Amer. Nat.*, 1903, *37*.
50. ————, "The Function of the Lateral-Line Organs in Fishes," *Bul. U. S. Fish Com.*, 1905, *24*, 183–207.
50a ————, *The Elementary Nervous System.* 1919.
50b ————, "The Origin of the Nervous System," *Pop. Sci., Mo.*, lxxv, 1909, 58.
51. ————, "Hearing and Allied Sense in Fishes," *Bul. U. S. Fish Com.*, 1902, 22.
52. Parmelee, W., *Science of Human Behavior*, 1913.
53. Peckham, G., and E., *Wasps, Social and Solitary.* 1905.
54. Peterson, J., "The Effect of Length of Blind Alleys on Maze Learning," *Beh. Monog.*, 1917, *3*, 1–53.
55. Pfungst, O., *Clever Hans.* 1911.
56. Rau, P., "Experimental Studies on the Homing of Carpenter and Mining Bees," *J. of Comp. Psychol.*, 1929, *9*, 35–70.
57. Riley, C., "The Sense of Insects," *Nature*, 1895, 52.
58. Sams, C., and Tolman, E., "Time Discrimination in White Rats," *J. of Comp. Psychol.*, 1925, 5.
59. Sanford, E., "Psychic Research in the Animal Field: Clever Hans and the Elberfeld Horses," *Amer. J. of Psychol.*, 1914, 25.
60. Scott, W., "Song in Birds," *Science*, 1901, *14*, 522.
61. Sherrington, C., *The Integrative Action of the Nervous System.* 1906.
62. Smith E., *Mind in Animals.* 1915.

63. Slonaker, J., "Normal Activity of the White Rat at Different Ages," *J. of Comp. Neurol., and Psychol.*, 1907, *17*, 342.
64. Thorndike, E., *Animal Intelligence.* 1911.
65. Tinklepaugh, O., "Experimental Study of Representative Factors in Monkeys," *J. of Comp. Psychol.*, 1928, 197–236.
66. Titchener, E., "Were the Earliest Movements Conscious or Unconscious?" *Pop. Sci. Mo.*, 1902, 60.
67. Triplett, N., "The Educability of the Perch," *Amer. J. of Psychol.*, 1901, 12.
68. Turner, C., "The Homing of Ants," *Jour. of Comp. Neurol. and Psychol.*, 1907, *17*, 376–437.
69. Valentine, W., "Visual Perception in the White Rat," *J. of Comp. Psychol.*, 1928, *8*, 369.
70. Washburn, M., *The Animal Mind.* 1926.
71. Watson, J., "Kinaesthetic and Organic Sensation," *Psychol. Rev., Monog.*, 1907, *8*, 1–100.
72. ———, *Behavior; an Introduction to Comparative Psychology.* 1914.
73. ———, "Circular Maze with Camera Lucida Attachment," *J. of Animal Behav.*, 1914, *4*, 56–59.
74. Yarbrough, J., "The Delayed Reaction with Sound and Light in Cats," *J. of Animal Behav.*, 1917, *7*, 87.
75. Yerkes, R., "Space Perceptions of Tortoises," *J. of Comp. Neurol. and Psychol.*, 1904, 14.
76. ———, "Inhibition and Reinforcement of Reactions in the Frog," *J. of Comp. Neurol. and Psychol.*, 1904, 14.
77. ———, "The Sense of Hearing in Frogs," *J. of Comp. Neurol. and Psychol.*, 1905, 15.
78. ———, *Almost Human.* 1925.
79. ———, *Introduction to Psychology.* 1911.
80. ———, and Bloomfield, D., "Do Kittens Instinctively Kill Mice?" *Psychol. Bull.*, 1910, 7, 253.
81. ———, and Morgulis, S., "The Method of Pavlov in Animal Psychology," *Psychol. Bulletin*, 1909.

CHAPTER VI

THE DEVELOPMENT OF THE HUMAN RACE

The Earliest Forms of Life. We shall preface our discussion of the development of man with a brief mention of certain animal forms which occurred in early geological periods and which antedate him in time. Scientific accounts of the history of the earth describe a very remote period during which no life existed. After a time organisms composed chiefly of water and without bodily parts hard enough to leave fossil remains made their appearance and disappeared without material bodily traces of their existence. Following these, there developed simple marine animals which later united to form colonies. These simple aggregations constituted the origin of later multicellular organisms. In the Proterozoic period immediately preceding the Paleozoic era are found traces of the trails of simple wormlike creatures. Some of these forms occur as low as 8,000 feet below the Cambrian (See Table II showing geologic periods).

Early Fossils. In the Cambrian period well-preserved invertebrate fossils are found. Crustaceans, mollusks and worms occur in considerable numbers. They are fairly complex and well developed. The remains of trilobites, or three-lobed creatures, indicate a fairly high degree of development in this period.

The Paleozoic era which embraces an estimated range of approximately 18,000,000 years is divided into five large periods. In the Cambrian, as we said, we find evidence of simple marine animals. In the Silurian period the shell animals come to dominate the scene. Here too the trilobites, having reached the peak of their development, begin to decline.

The vast upheaval of land regions during the early Paleozoic with the consequent increase in the rate of water flow is assumed to have prompted the rise of fish-like creatures. Their development was remarkably rapid, for in the Devonian period they appear to dominate the scene or to control the seas. Subsequent modifications in these forms produce simple amphibian forms, represented at the present time by salamanders, frogs, and the like, which were capable of living either on the land or in the water. In the Carboniferous period these creatures were

TABLE II

GEOLOGIC PERIODS AND THE DISTRIBUTION OF THE FOSSIL REMAINS OF ANIMALS IN THE EARTH'S CRUST (9).

Era	*Period*	*Years*	*Animals Characteristic of the Period*
Cenozoic (Era of Mammals)	Recent Pleistocene Pliocene Miocene Oligocene Eocene	3,000,000	Man; mammals, mostly of species still living. Mammals abundant; belonging to numerous extinct families and orders.
Mesozoic (Era of Reptiles)	Cretaceous		Bird-like reptiles; flying reptiles; toothed birds; first snakes; bony-fishes abound; sharks again numerous.
	Jurassic	7,200,000	First birds; giant reptiles; clams and snails abundant.
	Triassic		First mammals (a marsupial); sharks reduced to few forms; bony-fishes appear.
Paleozoic (Era of Invertebrates)	Permian		Life transitional between Paleozoic and Mesozoic eras.
	Carboniferous (Age of Amphibians)		Earliest true reptiles. Amphibians; lungfishes; first crayfishes; insects abundant; spiders; fresh-water mussels.
	Devonian (Age of Fishes)	17,500,000	First amphibian; sharks; first land shells (snails); mollusks abundant; first crabs.
	Silurian (Age of Invertebrates)		First truly terrestrial or air-breathing animals; first insects; corals abundant, mailed fishes; brachiopods; trilobites; mollusks.
	Cambrian		Invertebrates only.
Proterozoic		30,000,000	Simple marine invertebrates.
Archaeozoic			

very abundant. Here, too, the reptiles appear for the first time. Other animal forms such as scorpions and fresh water mussels are found in large numbers. During the Permian age, the Paleozoic or the era of "old life" was brought to a close. Toward the end of the Paleozoic, according to the evidence at hand, extensive glaciation occurred which presumably resulted in the extermination of a great many of the more primitive forms of animal life.

The beginning of the Mesozoic or "Middle life" era is significantly marked by the appearance of primitive mammals, presumably as a

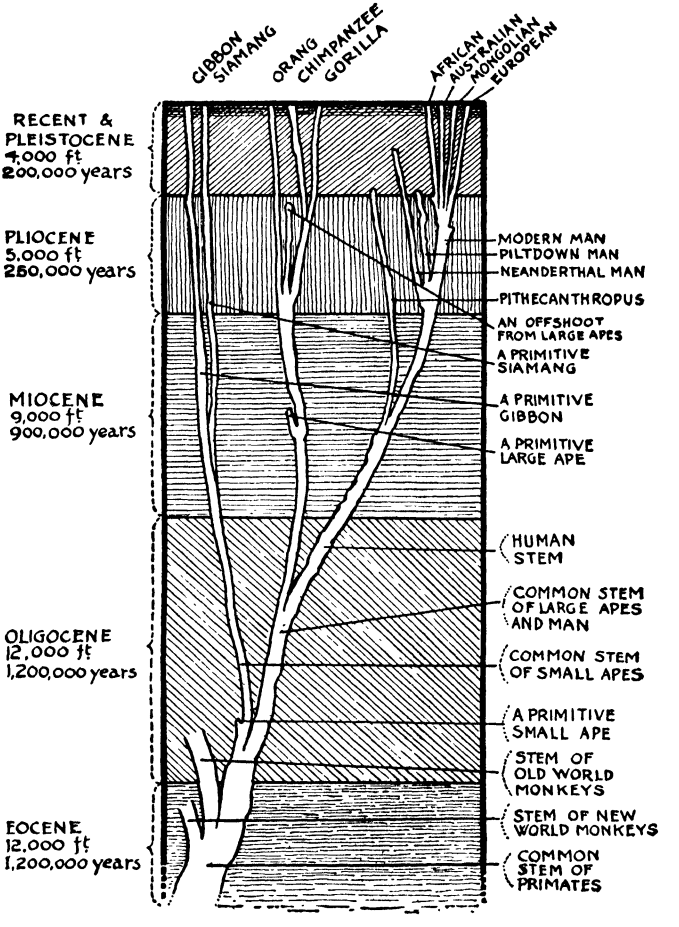


FIG. 24. Man's genealogical Tree. From a generalized "Primate" stem there were separated off first, the New World Monkeys; second, the Old World Monkeys; third, the smaller Anthropoid Apes; fourth, the larger Anthropoid Apes. From the Humanoid stem there came the *Pithecanthropus* stock, the *Neanderthal* stock and *Homo sapiens*. From Keith. After Thomson, *Concerning Evolution*. By permission of the Yale University Press.

variation from reptilian stock.[1] These creatures were more able than the reptiles to exist under adverse conditions such as periods of extreme

[1] According to Hegner, "The earliest living mammals are descended from reptilian ancestors" (9, 696).

cold. These earliest mammalian forms are best represented today by the duckbill or platypus of Australia—a strange animal. This simple mammalian creature has a skeleton much like a reptile and lays eggs after the manner of many reptiles and birds, but the young upon hatching are nourished by the milk of the mother—a characteristic generally common to the mammals. During this same period the reptiles reached gigantic proportions. Here belong the dinosaurs of awe-inspiring dimensions. These creatures had enormous bodily bulk but extremely small brains. Probably this lack was one of the primary factors responsible for their final disappearance.

The Cenozoic, or era of "New Life," embraces the present time. It is often called the age of mammals. These forms, which previous to this period were quite inconspicuous, now show a rapid diversification and a striking degree of development. They dominate the scene just as other forms of life ruled during the earlier periods. This is also the age of man, for in the Eocene[1] period we come more clearly upon the very remote origins of the human stock. Figure 24, taken from Keith and Thomson, shows the ancestral stems and probable line of descent of the higher primates. It also gives some notion of the relative recency of this one phase of organic development. The entire Cenozoic era embraces an approximate time of three millions of years, which is extremely short as compared with the total lapse as shown in Table II. We wish to dwell now for a moment upon man's relation to certain of his subhuman relatives.

MAN AND ANIMAL

Man a Mammalian Vertebrate of the Primate Order. Although man is unquestionably superior in many respects to all animal forms, he is, nevertheless, an animal; and he is assumed to have been derived from simpler forms. Man we say is an animal of the vertebrate order. Among the ties which join him to this large group we point out first of all that his body is supported by a bony axis or a vertebral column to which limbs are attached and to one end of which the skull is joined. Furthermore, he is a mammal in that he is hairy, possesses a four-chambered heart and mammary glands. He is one member of a large Primate group. His affiliations with this extensive order are made clear by the five digit arrangement upon hand and foot, by the opposition of the thumb to the other digits, by the striking motility of the big toe, particularly during infancy, by the presence of an abundant coat of hair (during the prenatal stage), by the fact that his first set of teeth

[1] Eocene means the dawn of the new.

is shed preliminary to acquiring a permanent set, and by the chemical constitution of his blood. In connection with the last point we might say that it has been shown that the blood of man and the great apes when given certain critical tests shows almost the same chemical reaction.

Suppose the blood serum of a rabbit, which has had human blood injected into it, be added to human blood. It forms a precipitate. Now it forms *almost* as marked a precipitate when it is added to the blood of an anthropoid ape. This shows relationship. But take a step or two more. "The reaction to the blood of the lower Eastern monkeys is weaker, that to the Western monkeys weaker still; indeed, in this last case there is only a slight clouding after a considerable time, and no actual precipitate. The blood of the Lemuridea ("half-monkeys") gives no reaction, or an extremely weak one, that of the other mammals none whatever. We have in this not only a proof of the literal blood-relationship between man and apes, but the degree of relationship with the different main groups of apes can be determined beyond possibility of mistake" (*33*, 9).

Origin of Primates. The order of Primates includes the lemurs, the monkeys, the anthropoid apes and man. The lemurs, the most primitive of the primates, are squirrel-like creatures possessing a long tail. The fingers and toes bear nails; the teeth are somewhat human-like; the face is rather elongated and the brain case is of rather small dimensions. Lemurs spend almost their entire life in the trees.

The primitive antecedents of the lemurs and also of the other Primates are to be found in earlier mammalian forms, best represented today by the shrews (Insectivores). There are two living forms of the shrews—the jumping, which is strictly a ground creature, and the tree shrew, which is arboreal in habit. The first is very closely related to the earliest mammals. The tree shrews, however, "display in the structure of their bodies positive evidence of relationship to the stem of the aristocratic Primate phylum" (*31*, 25). They are interesting little creatures, which almost became Primates. What they failed to achieve, a primitive lemuroid perhaps quite similar to the little living mammal, Spectral Tarsier, succeeded in doing.

Spectral Tarsier: A Very Primitive "Monkey". Spectral Tarsier from a scientific view is an important creature. Tiny enough to sit with its offspring on a man's hand, it may be regarded in a way as a very primitive monkey-like creature, the early ancestors of which were

also the ancestors of the entire group of lemurs and other Primates.[1] Tarsier possesses a relatively large brain, has a real face with very prominent eyes and most likely perceives keenly and binocularly.

The differentiation of the Shrews, resulting directly in the rise of an arboreal mammal, was indeed a momentous event, inasmuch as it served to prepare the way for the appearance of the higher Primates including man. Although man is essentially a ground creature, it seems most likely that the primate characters which have contributed so largely to his origin were actually developed under life in the trees. So long as the stock remained on the ground, the brain was largely olfactory in function. The organism drew very heavily upon the sense of smell in securing food, in the recognition of mates and in finding its way about. Perhaps the wide use of this sense was so great that the type of development necessary to produce the higher Primates was not possible. The animal that lives through its nose obtains surprisingly little knowledge of the form, size, distance, and direction of environmental objects. It makes little use of the visual, tactual and auditory resources. It knows little about objects aside from their smell.

The Significance of Life in the Trees. With the rise of arboreal forms of life, changes fraught with profound significance for later development occurred. When the animal's nose was lifted from the ground to the tree-tops, it lost most of its practical value. But the animal made up for this loss by drawing more heavily upon the other senses. This shift in sensory function is to be inferred from the relative size of the various regions of the brain in which the primary stations for the various senses are located. An examination of the brains of lower and higher vertebrates (See Figure 17) shows a striking decrease in the latter in the olfactory areas and a corresponding increase in the visual, tactual and auditory areas. The motor area, too, shows development, because life in the trees calls for a fairly high degree of control and coördination of movements.[2] The creature which sprawls upon the ground has much

[1] Smith, for instance, points out that "the common ancestor of all these Primates was a Lemuroid nearly akin to the curious little Spectral Tarsier, which still haunts the forests of Borneo, Java, and the neighbouring islands, and awakens in the minds of the peoples of those lands a superstitious dread—a sort of instinctive horror at the sight of the ghost-like representative of their remote Primate ancestor!" (*31*, 24)

[2] "The adoption by some of these Shrews of the habit of living in trees brought about profound changes in the relative proportions of the brain. The sense of vision became enhanced in importance, and the sense of smell correspondingly reduced: but in addition the senses of touch and hearing, and the power of agility of movement, were considerably enhanced. In one of these groups the importance of vision became still further increased, and the result of this was to bring into existence the Order Primates" (*31*, 12).

less need of the agility and the quickness of action which characterize the animals which live among the tree-tops. An examination of the brain of the reptile, for instance, shows the major emphasis laid upon the olfactory area. In the bird, this region is greatly reduced. Greater stress is placed upon other sensory areas. As we have pointed out, brain development in mammals and in man is characterized in other ways. In the mammal, *e.g.*, in the shrew, we find on the one hand a greatly lessened olfactory region, and on the other hand a significant development of the cortical materials. As we know, it is the cortex which make possible highly modifiable behavior and the long retention of acquired patterns. Thus we find the primitive mammal plainly exhibiting in a greatly simplified state the neurological conditions which come to full flower among the apes and man.

The Appearance of Monkeys and Apes. During the early Eocene period, the Primate stem gave rise to the primitive stock of New World monkeys, representatives of which are now found in great numbers in South America. These creatures are small or medium in size. The thumb is opposable to the other digits. The tail, long and prehensile, is of great aid in getting about among the trees. The skull, too, stands up above the eyes so that the creature has somewhat of a face.

Presumably wandering forth from their home "somewhere in the neighborhood of Central America; and crossing land bridges into Africa," the Primate stem produced there, first of all, the basic stock of the Old World monkeys. Contemporary representatives of this branch are quadrupedal with the hind limbs about as long as the front limbs. They usually have a long tail; but unlike their New World relatives, the tail is not prehensile. They are very agile, show a high degree of motor coordination and possess well-developed receptor organs. During the Oligocene period the primitive Primate stem branched again to produce the stock represented today by the gibbons and again later the common stock of the orang, the gorilla and the chimpanzee. All four kinds belong to the family of true apes (Simiidae). In these the long tail of the monkey is lacking, locomotion is often bipedal and when walking they may rest the knuckles of the hands on the ground.

The orang-outang is mainly arboreal in its habitat and largely insectivorous in food preferences. Because of the higher arch of the crown over its eyes it cannot walk well on all fours and at the same time look ahead. Upon assuming an upright posture, however, this easily becomes possible. The gorilla which is found in the forests of western Africa is mainly arboreal. It is the largest of all Primates, ranging upwards at times to 500 pounds in weight. On ground it is

semi-erect and walks by the aid of the backs of its hands. Its neighbor, the chimpanzee, is the most manlike in appearance of all the anthropoid apes. It has heavy over-arching brows, a well-developed and convoluted cerebrum, and surpasses, perhaps, all subhuman animals in degree of educability. At the very top of the Primate group stands man. He holds his commanding position by virtue of his entirely erect posture, by his greater brain development, by the refinement of his hand, by the use made of speech and by the large development of psychological functions, particularly those of memory, imagination, and thinking.[1]

HUMAN SOURCES

A problem of supreme importance for the student of human development is that of the sources of man. Lacking material evidence in the form of fossilized remains to relate man directly to earlier mammalian forms, various theories have been formulated concerning the exact nature of the sources of man. Of these, two are deserving of mention. The one theory maintains that man has been derived from the anthropoid apes; the other asserts that man and the apes have come from some common stock.

What Is Man's Relation to the Ape? The first theory is the older. Not long after Darwin brought forth his doctrine of evolution, the ape-man theory of the origin of man was formulated. It traced man directly to an ape-like forebear. The race of man, according to this theory, sprang from an ape. Among the earlier students in sympathy with this point of view, we mention Huxley, Haeckel and Darwin. These men saw the very obvious likenesses, both structural and functional, between man and the huge apes; and they were led to the conclusion that in the Simian forms of the higher Primates of today, man can at least dimly see his more simpler beginnings; for man, to them, is an offshoot of an ape stock.

This point of view is sponsored by outstanding individuals. Gregory, a notable authority in the field of human origins, holds that the higher Primates arose from a primitive ape-like ancestry. Thus, present-day man represents the outgrowth of some prehistoric anthropoid stock.[2]

[1] We must agree with Fasten that "If there is one feature that especially marks him (man) off from the rest of the animal kingdom, it may be said to be his psychical development. While in many respects man shows the same psychological behavior as the higher Primates, yet in the one feature which has already been mentioned, namely, his intelligence he may be said to be much higher than they, being really in a class by himself, dominating the entire animal kingdom" (p. 354).

[2] From Gregory we learn that, "No matter how many millions of years ago man and the chimpanzee parted company, the anthropoid apes are still justly regarded as man's nearest relatives among existing mammals, and the most intensive research

Other eminent authorities, such as Elliot Smith, Keith, Schwalbe, and Wilder hold to the same point of view.

But to many the problem of man's origin may be solved in a slightly different manner. Apes and man, they claim, go back together to a remote period, perhaps to the Oligocene, at which time a more primitive and common stock became differentiated into at least two branches. The one branch developed into man; the other, into contemporary apes. Man and ape thus had a common origin or a common source. The human branch, however, pushed rapidly ahead to produce man. The other became specialized and set in the form of the ape. Because the latter has become specialized, it lacks the plasticity necessary "for the attainment of the high powers of adaptation which represent one of the most distinctive characteristics of the human family." Osborn, who views man's origin in this way, maintains that no ape can be found in man's history. Regardless of how far back into remote times we may follow man's lineage, we never come upon an ape turning human; for ape and man emerged from some common ancestry, which possessed many of the primitive characteristics of the anthropoid and human stocks.

Why Did Primate Stem Leave the Trees? An interesting question in connection with man's origin has to do with the immediate occasion which served to produce a ground dweller out of a tree dweller. If man's course of development ran from the ground (shrew) up through the trees, what brought him to the ground again? That man's remote lineage includes a tree dwelling member is widely accepted today.[1] Many explanations, have been advanced to account for this particular developmental step. Read, for instance, contends that the determining variation was the "adoption of a flesh diet and the habits of a hunter in order to obtain it. Without the adoption of a flesh diet there could have been no hunting; but a flesh diet obtained without hunting could have done nothing for the evolution of our Family" (*28*, 2). He finds that there are two ways in which this may have happened: either by such a variation on the part of our ancestors that he felt "a stronger

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has brought forth no adequate reason for doubting that man is an offshoot from the Old World Primates and in particular that he represents a highly modified offshoot of the anthropoid stem" (*13*, 385).

[1] Gregory, for example, points out that "at the present time the weight of a great many independent investigations is overwhelmingly in favor of the view that at one time man passed through an arboreal stage of life, not remaining there long enough to become over-specialized in that direction like the existing anthropoids, and that at a later period he came down out of the trees, preserving his erect arboreal posture and becoming a bipedal cursorial animal" (*13*).

appetite for animal food than the gorilla or by such a change of climate in the region he inhabited—say from a subtropical to temperate—as to make his former diet scarce, especially in winter, so that he became a hunter to avoid starvation." Tyler, too, stresses the rôle played by the food drive. Of the momentous step of the Primate stock down from the trees, he writes, "either caught in some dwindling forest region or open park-land or tempted by the richer supply of food on the ground, they (anthropoid stock) began to venture to come down from the trees; to search for roots and bulbs, berries and similar fruits, insects and their larvae, and the small animals living along the streams. It was a hazardous experiment; but they made it, somewhat from inclination, far more by compulsion" (*34*, 42).

The Location of Man's Origin. A final question remains to be considered before we turn to our discussion of the earliest known forms of actual human stock. This question concerns the geographic location of man's origin. We have said that the primitive Primate stock, after giving rise to a branch of New World monkeys was assumed to have crossed into Africa. Either in Africa or in Asia, to which the stock eventually spread, new forms appeared. Certain students of early human life are inclined to place man's origin in Asia and somewhere in the now high plateau region of Tibet and Chinese Turkestan. Concerning the fascinating problem of the very "cradle of the human race" we learn from Thomson that "various facts point towards Central Asia as a probable headquarters. Among the reasons for this conclusion may be mentioned the antiquity of Asiatic civilization, the Asiatic origin of most domestic animals, the Asiatic suggestion in some Crô-Magnon features, and the fact that the oldest human remains are in Java" (p. *22*). Recent discoveries by Andersson and others in China lend additional weight to the belief that man's rise really occurred in Central Asia. Andersson, for instance, found teeth embedded in deposits, either of the late Pliocene or early Pleistocene period. These are believed to have belonged to a human being who must have lived a great many years ago.

EVIDENCE OF MAN'S ANTIQUITY

There are several lines of evidence which tend, as we know, to throw light upon man's antiquity. One very valuable source consists in the early documents found inscribed on stones and in which use is made of *highly developed symbols*. Such symbols unquestionably imply a long history; for their development must have meant a gradual process extending over a great period of time. Another source of information concerning man's age is found in the weapons and implements employed

in the conduct of warfare and in the chase. Remains of man found among simple flints of the Old Stone Age are assumed to be older than other remains which occur among the implements of the New Stone Age. A third and very important line of evidence lies in the discovery of human fossils. The first two lines of evidence consist of products of man's activities; the last is represented by his own skeleton preserved by Nature through the ages.

There are extremely few conditions under which the bony remains of early man have been preserved for us. Such remains, we know, have at times been covered to great depths by drifting sands (loess) and so preserved throughout the years. In some parts of the world, for instance in China and in the Mississippi Valley, such wind deposits are very extensive. A more common method of preservation has been by way of river sedimentation. Individuals caught and buried under layers of sediment may again be exposed to view through erosion of such earlier deposits. The remains of the Java man, for example, were thus brought to light through the work of a river current. Perhaps the most fruitful source of fossilized man is the cavern, dug out by the erosive activity of subterranean waters, which apparently afforded in the early days a fairly safe retreat for primitive man. He lived, died, and occasionally left his remains in such places. In a few cases, such caverns form veritable mines of inestimable value to the student of early human life.

Once uncovered, the approximate age of human remains is then to be determined. If the fossils are covered or surrounded by undisturbed rock or sand deposits, reference is made to the geological age of the particular fossil bearing stratum. This is a most widely employed criterion. One may, on the other hand, estimate the approximate age of such remains through a study of the animal forms or the artefacts so frequently found embedded along with them. However, there must be clear evidence that such accompanying forms could not possibly have been deposited at significantly earlier or later periods than that at which the human being was bedded down.

FOSSIL REMAINS OF EARLY MAN

We turn now to consider the history of man, as revealed by the fossil remains of early human stock. In so doing we face, first of all, in the direction of Java, where the remains of the earliest known human being, a very primitive creature which some have called the Java ape-man, were found.

Java Ape-Man. About forty years ago Dubois discovered on a river bank in Java some scattered remains—teeth, skullcap and thigh-

bone—of a prehistoric creature that possessed characteristics which apparently placed it partly between ape and man (*Homo sapiens*).[1] He was roughly similar to an imaginary man which Haeckel had earlier pictured and named *Pithecanthropus*. Because of the straightness of the thigh-bone and certain other notable characters, Dubois called his early man *Pithecanthropus erectus*.

Before they were disturbed by the river the bones of *Pithecanthropus erectus* rested in a bed approximately forty-five feet below the surface. Above his resting place towered stratum upon stratum of deposits. But he did not rest alone. Scattered around in the same bed were the skeletal remains of more than twenty-four (Lull) kinds of mammals, all of which are now extinct. But the strata and the animal remains tell a common story: the Java Man is very old. In years, perhaps his age runs to a half million. He is, in short, a true Pliocene Man (Thomson).

Although *Pithecanthropus* represents a type of creature very old and quite primitive, he is apparently manlike in many respects.[2] According to Keith, in the living flesh he was "human in stature, human in gait, human in all his parts save his brain." In height he was about the equal of the average American male. The skull (See Figure 25) shows the low sloping forehead and the protruding brows characteristic of the anthropoid stock, but at the same time it suggests a creature which possessed a cerebrum much more extensive than that of the anthropoid apes. The estimated skull capacity of *Pithecanthropus*, as determined from the dimensions of the skullcap, was about one thousand cubic centimeters. This is about four hundred more than the average skull capacity of the huge apes and considerably less than the average brain capacity of some of the smaller (lower?) human stocks. The skull suggests, furthermore, that the creature possessed the brain conditions necessary for articulate speech. The cap also shows the general contour of the head and the position of the eyes. The latter suggest an upright rather than a quadrupedal creature, for an organism that moved on all fours with eyes placed under a dome of the type possessed by this creature would find it extremely difficult to look ahead. The thigh-bone, too, points clearly to an erect posture. This in turn seems to mean a ground,

[1] "There has been and still is much difference of opinion as to the exact position of this interesting being. Opinion was long divided nearly equally between those who considered it as the highest ape and others who held it to be the very lowest man" (*34*, 44).

[2] Smith finds that "there are very definite reasons for including the Javan fossil *Pithecanthropus* within the Human Family, and also for regarding it as the most primitive member of that Family, though probably not on the direct line of ancestry of the higher races of men" (*31*, 59).

rather than an arboreal life. Getting down from the trees must have meant greater freedom for the hands, a significant change in mode of locomotion, and a probable change in the nature of food and food supply. The organism now could greatly extend its habitat. It ceased to be a prisoner tied to the trees. The wide prairies no longer beckoned in vain.

The Heidelberg Man. This very primitive stock is represented by a lower jaw (See Figure 25) found in a river bed not far from Heidelberg. It has great scientific value, particularly as it constitutes the first direct evidence of the occurrence of early man in Europe. It was discovered more than seventy feet below the surface of the valley. The jaw is well-preserved, complete in every minor detail, but heavy and quite massive. Because it is chinless and slopes backward, it has a distinctly anthropoid appearance. The teeth, however, are definitely and unquestionably human. They are relatively small and fairly evenly spaced, and they are so shaped that they would not interfere with the rotary motion of the jaws—a characteristic which distinguishes man from the apes. From this jaw, the remainder of the skull has been cleverly reconstructed, giving a head which roughly resembles the gorilla type.

The Piltdown Man. About twenty years ago the remains of the so-called "Dawn Man" (*Eoanthropus*) were discovered in a gravel pit near Sussex, England.[1] They consisted of parts of the skull and the lower jaw with some teeth in place. Associated with these human relics were certain crude implements and the skeletal remains of several extinct mammals, including the mastodon, the hippopotamus and the woolly rhinoceros. The skull is very heavy and thick-walled, averaging about four-tenths of an inch. There is a rather steep anthropoid-like forehead without prominent brow ridges. (See Figure 25.) The brain case is approximately one thousand cubic centimeters in capacity. The jaw is apish, but the brain is human. Such a combination as this, according to some, is to be expected. The brain leads the way in the process of development. Elliot Smith (p. 68) tells us that it attained "the human rank at a time when the jaws and face, and no doubt the body also still retained much of the uncouthness of Man's Simian ancestors. In other words, Man at first, so far as his general appearance and build are concerned, was merely an ape with an overgrown brain. The importance of the Piltdown skull lies in the fact that it affords tangible confirmation of these instances."

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[1] "The discovery of the remains of the Piltdown Man is perhaps the most remarkable episode in the whole history of anthropology. . . . It represents the most primitive member of the Human Family, excepting only the ape-like Javan fossil, *Pithecanthropus*. . . ." (*31*, 66).

Rhodesian Man (*Homo rhodesiensis*). In 1921, workmen discovered the remains of an early man in a cave in northern Rhodesia. The bones —skull and many other skeletal parts—were found ninety feet below the entrance of a cave at the bottom of a great mass of loose débris containing many animal bones. The skull (Figure 25) suggests that the individual, in some respects, is very similar to modern man. Smith believes that this race is superior to Piltdown Man but inferior to the Neanderthal Man; that is, he is intermediate to these two types. The skull and under jaw have a distinctly apish appearance. The eye sockets are more square as in the gorilla and less round as in modern man. The brain is larger than any of the preceding forms, but the association areas still lack the degree of development found either in Neanderthal Man or in modern man. Of the brain of the Rhodesian Man, one student writes:

> It is of special interest to note that the defective areas of the brain are those parts which attain their maturity latest in the developmental history of the modern human infant, and are especially associated with the discrimination of the form, weight, and texture of objects as they appeal to the sense of touch, with the power of learning highly skilled movements with the hands, and, in a general sense, with the higher intellectual functions. The part of the brain which has been found to be highly developed in several modern men distinguished for musical genius is remarkably small, and simply folded, in the Rhodesian brain. This brain, in fact, was deficient in those parts by which the degree of foresight, discrimination, and refinement of modern men is determined and made possible (*31*, 86).

Neanderthal Man (*Homo neanderthalensis*). The Neanderthal race is perhaps the best known of all of the early forms of man. There are many fairly complete skeletal remains of this ancient stock. The first evidence of the new race was uncovered in the cavern on the side of the Rock of Gibraltar in 1848. A short time later the greater portion of an entire skeleton was found in a cave in the side of a cliff above a river in the Neanderthal Valley (Germany). Still later two complete skeletons were discovered in Belgium. Since then representatives of the race have been found in France, Spain, Belgium, Germany, and Austria.

The skeletal remains suggest a race of "clumsy, shuffling loose-jointed" individuals of great muscular power. Their gait and posture were somewhat apish in character. The upper part of the body was distinctly inclined in a forward direction causing the arms to dangle in front of the body as in the ape. The legs, too, in walking were slightly bent at the knees. The skull was large even above the average of modern man with a capacity of about 1600 cubic centimeters, but the vault

was low and the most important parts of the brain—that is, the cerebral hemispheres—were not as prominent as in modern Man. The eyebrows were fairly heavily ridged; the jaw was chinless; the head, placed on a very thick neck, was thrust forward in a somewhat apish manner (Figure 25).[1]

From the implements found beside his bones we may infer that this form of early man was apparently skillful in shaping and using flints. He probably hunted the bison, the reindeer, the woolly rhinoceros, the mammoth, and the wild ox, with darts, spears, and stone hatchets. It is also evident that he made some use of fire. And if we may judge from the "reverential burial of his dead surrounded by beautifully wrought objects whose surrender implied a very real sacrifice on the part of the survivors, together with apparent food, (he) had in greatest probability a belief of some sort, in immortality" (*21*, 26).

Neanderthal Man probably disappeared as a race a long time ago, but characteristics of the stock are still faintly discernible, according to some students, among certain modern but widely separated groups. Some are found in Holland, others in Ireland, and still others in Australia.

Crô-Magnon Man (*Homo sapiens*). Modern man was preceded by Crô-Magnon Man. Skeletal remains of representatives of the Crô-Magnon race were first found in Wales. A little later (1856) in the rock shelter of Crô-Magnon near the village of Les Eyzies in France, parts of the skeletons of five individuals were found.[2] These included the bones of an old man, a woman, two young men, and a child. Since that time many other remains have been found in various parts of Europe. The men of the Crô-Magnon race were straight and sturdy. In stature they slightly excelled modern man. The head of Crô-Magnon Man was large, the face was fairly broad, the chin was firm (Figure 25). According to Lull, Crô-Magnon Man is, in almost all respects, "the most perfect man physically that has come within our knowledge." The

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[1] Elliot Smith gives this striking picture of Neanderthal Man: "The heavy overhanging eyebrow-ridges and retreating forehead, the great coarse face with its large eye-sockets, broad nose, and receding chin, combined to complete the picture of unattractiveness, which it is more probable than not was still further emphasized by a shaggy covering of hair over most of the body. The arms were relatively short, and the exceptionally large hands lacked the delicacy and the nicely balanced co-operation of thumb and fingers which is regarded as one of the most distinctive of human characteristics" (p. 70).

[2] This race gets its name from the French patios for great hole or pit. The rock shelter in which the remains were found was a short distance away from a huge gravel pit.

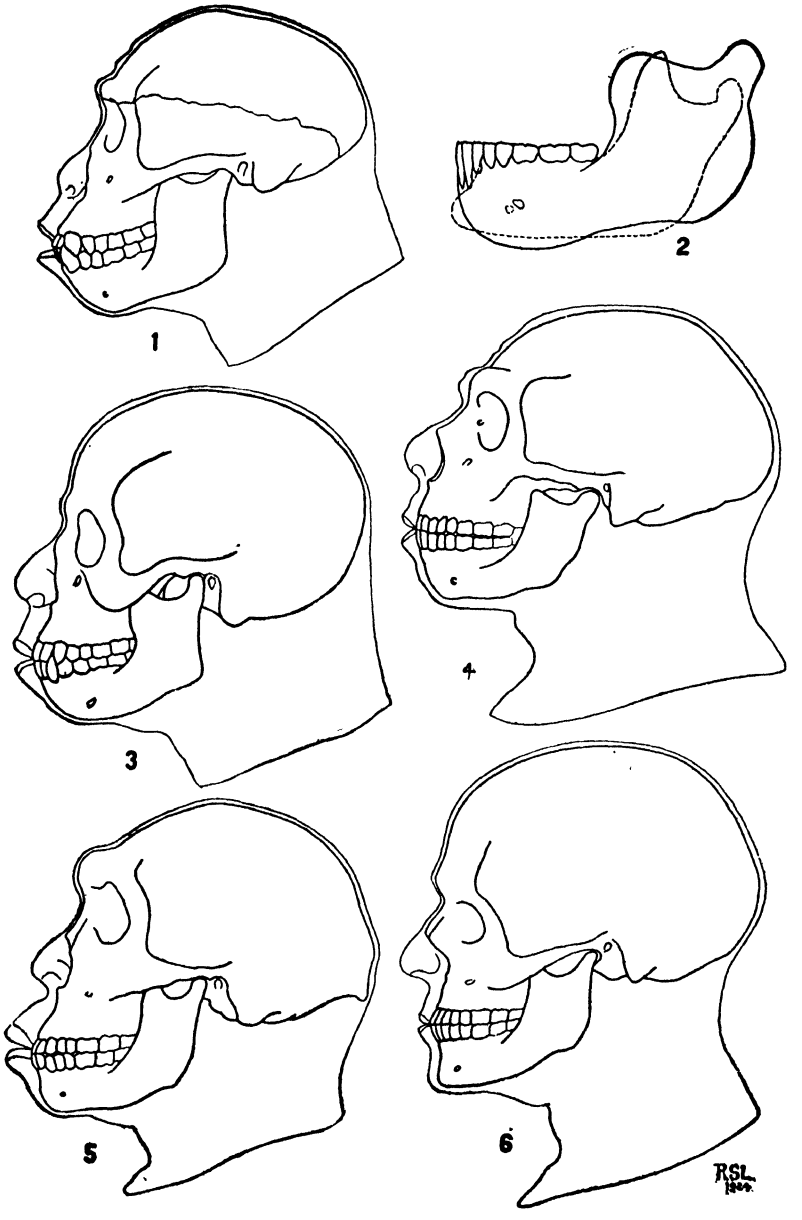


FIG. 25. PREHISTORIC HUMAN SPECIES

1. Java ape-man; 2. Jaw of Heidelberg man compared with jaw of modern man; 3. Piltdown man; 4. Neanderthal man; 5. Rhodesian man; 6. Crô-magnon man. From Lull, *The Ways of Life*. By permission of Harper and Brothers.

skeletal remains of this race suggest that the individuals were active in gait, powerful in physique, and highly intelligent.

The character of the psychological ability of Crô-Magnon Man is clearly shown by his artistic creations in the fields of engraving, sculpturing and painting. Many evidences of his creative bent are to be found on the walls of his cavern homes in France and in Spain. The representations are mostly of animal forms, although the human is not neglected. The wealth of detail and the accuracy of reproduction found in these illustrations clearly indicate a high degree of observational ability and a proper understanding and appreciation of bodily proportion.[1] But their artistic abilities were not confined to the walls and ceilings of their retreats. They worked on bone, on ivory, and on horn. Moreover, they developed tools adequate for such artistic endeavors. They apparently outshone their simpler predecessors, the Neanderthal men, in every respect. Although both worked with stone, the men of the Crô-Magnon race produced well-developed flint instruments. In addition they fashioned from ivory, bone, and horn such implements as the bone needle, the javelin point of bone, the javelin dart, and the harpoon of horn. Various lines of evidence indicate that the Crô-Magnon race used caves as fairly permanent habitations; and employed fire probably for warmth, for protection, and for cooking. In his arts, in his industries, and in his language Crô-Magnon Man apparently possessed the basic materials of our civilization.

The Disappearance of the Crô-Magnon Race. The Crô-Magnon race undoubtedly represented the best in man up to his time, but interestingly enough only slight traces of his kind are to be found in the living stocks of today. He and his characteristics have practically disappeared. In Southern Europe there are groups which possess characters somewhat suggestive of this earlier race, and in certain regions of the Himalayan Mountains we find types which seem to point to a Crô-Magnon ancestry. As a race they suddenly appeared in Europe, presumably from some eastern locality, to displace Neanderthal Man. After a long sojourn here they rather suddenly and somewhat mysteriously declined and disappeared.

Many theories have been advanced to account for their disappearance. Osborn writes that their decline may have been partly due to "environmental causes and the abandonment of their vigorous nomadic mode of life, or it may be they have reached the end of a long cycle of

[1] Tyler points out that these men "covered the walls of caves with drawings and paintings representing animals with a lifelikeness and spirit not excelled by the most successful modern painters" (*34*, 51).

psychic development. . . ." About his having lived there can be no question; but where Crô-Magnon Man came from and where he went, assuming that he was not totally exterminated in Europe, are problems which remain unanswered. It is somewhat disturbing to the thoughtful

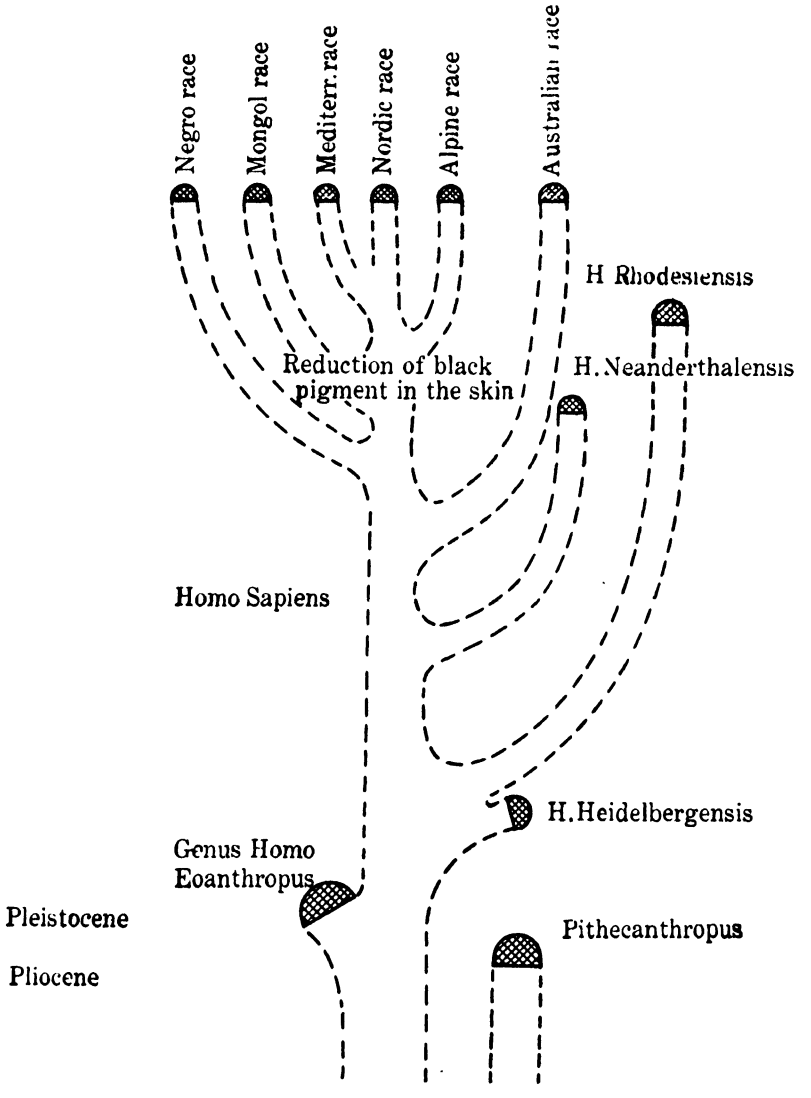


FIG. 26. A schema of the relationships of different genera, species, and races of the Human Family. From G. Elliot Smith, *Essays on the Evolution of Man*. By permission of the Oxford University Press.

man when he ponders upon the fact that a race of men as splendid as the Crô-Magnon should apparently flourish for a time and then rather quickly disappear without leaving material evidence of the causes of their going. Of the assumed end of this period of decline, Tyler gives the following picture: "The Ice Age wore away. The tundra with its mosses and shrubs gave place to meadow and forest. The reindeer, the chief food of the Crô-Magnon hunters, went eastward and northward, and gave place to the forest stage. The hunters of the reindeer became fewer in number, and were succeeded by an inferior lot, apparently of fisher-folk along the streams. The long Paleolithic period had ended" (*34*, 52).

So far we have sought to show in a very brief manner the course of development up to the present stock. Beginning with simple mammalian forms we found that the way led past the Primates; past *Pithecanthropus* who probably lived even before the first glacial period of Pleistocene times; past the Heidelberg race of men living during the long warm second interglacial period; past the Piltdown Man and the Rhodesian Man; past the Neanderthal race, which occupied Europe for a long time including the third interglacial epoch; and, finally, past the splendid Crô-Magnon type of the postglacial days whose going marks roughly the close of the Paleolithic, or the Old Stone Age, and the beginning of the Neolithic, or the New Stone Age, in Europe. Figure 26 is meant to show the various branching of the Primate stem to produce the early and the modern races of man. We must now say a few words concerning those peoples who followed Crô-Magnon Man.

THE DAWN OF CIVILIZATION

The New Races of Europe. Evidence points to the beginning of Neolithic culture in Europe about 10,000 B.C. This epoch lasted until about 2,500 B.C. During this long period of time this part of the world was repeatedly overrun by migratory peoples presumably coming from Africa and from Asia. The Mediterranean or the brown race appeared and spread northward over France and England. A blonde race coming in took possession of northern Europe and settled around the Baltic. A third stock, the Alpine race, entered to make their homes in the uplands of the Rhone and the Rhine and in the foothills of the Alps. Out of these three races the present population of western Europe has been mainly compounded.[1] The first two races are somewhat akin to the Crô-

[1] It is pointed out by an outstanding student of early man that no one "entertains the view that Man was evolved in Europe. Moreover, in the opinion of most serious investigators, the evidence in support of the theory that all the known early races of Men, those of Piltdown, Heidelberg, Neanderthal, and Crô-Magnon, and the various

Magnon race, and are assumed by some to have come to Europe from regions not remotely distant from that in which the Crô-Magnon stock was developed. Alpine Man, however, bears little resemblance to the Brown and to the Blonde races. Although presumably derived from the same common stock, he is supposed to have been long isolated from the other species of the white race. His isolation resulted in his becoming differentiated from the common stock.

Each new wave of population probably made some contribution to the slowly developing arts and industries of man, for it is most likely true that no one group or race developed even a major portion of what we find in the culture of these earlier periods. One stock added a bit here; another a bit there. New interests arose, and old interests declined. Sometimes the appearance of the new resulted in a decline of the old. Thus the practice of decorating the walls of caverns gave way to the art of basket weaving, pottery designing, and the like. Sometimes the new and the old flourished for a time side by side. Thus new and old ways of working in stone were long perpetuated together.

Neolithic Culture. Early in the Neolithic Age men produced polished or smoothed stone implements. They also developed the bow and the arrow. They discovered the art of making pottery and weaving cloth. They domesticated the sheep, the pig, the ox, and the horse. Long before this, perhaps even before the beginning of the Neolithic period, man had domesticated the dog. Neolithic men became farmers. Grains and fruits were cultivated. They abandoned their caves and lived in houses built of timber. The development of such arts and industries had an incalculable influence upon man. Diet became more varied; property accumulated; group permanency was furthered; social relations improved; conditions of living became less precarious; and man had more time for the development of the esthetic side of his nature.

The discovery of the way of producing bronze led to the development of what is known as the Bronze Age and to the historical end of the Neolithic period.[1] Bronze was used in Europe around 2000 B.C., where it was introduced from Western Asia. Along with working in bronze went other important discoveries, such as the wheel and the

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peoples who intruded into Europe until the Neolithic phase of industry came into existence, were each of them immigrants who had acquired their distinctive features and the germs of their culture elsewhere. In other words, there is nothing to suggest that the evolution of one type from another occurred in Europe" (*31*, 97).

[1] It must not be assumed that the discovery of making metal implements really ended the use of stone. Every one recognizes the fact that established ways of acting are slowly put aside. This was true of man's habits of working in stone. The various Ages (Stone, Bronze, and Iron) greatly overlapped.

making of bricks. Finally with the introduction of the use of iron we come to the beginning of our own era.

THE COURSE OF PSYCHOLOGICAL DEVELOPMENT

We have sought to depict the general course of man's development as a total organism. We have not attempted to abstract his mind and deal with it as a separate entity. Nor do we wish to do so. We do desire, however, to say a word concerning the nature of the psychological functions in man considered racially.

It is agreed that we cannot look to any lack of perceptual ability in early man as a key to an understanding of any inferiority to modern man. It is probably true that he enjoyed, in common with many still lower forms, perceptual abilities as keen as those of modern peoples. It is undoubtedly true, however, that he put them to uses quite different on the whole from the ends which they serve in modern man. Vision for early man must have been a device for tracking his prey, for avoiding his enemies, and for reading natural signs upon every hand. He probably made greater use of olfactory abilities than does modern man. It was a device for furthering him in his conquests of nature. Because of the practical uses to which these—as well as the other abilities—were put, the early forms of the human stock found fewer occasions than modern man for employing the psychological functions in a more purely esthetic manner. With Crô-Magnon Man, however, the evidence points clearly to perceptual uses in many respects quite like those of modern man.

Memory and imagination among the earlier human stocks were no doubt inferior to those functions as found for instance in the Crô-Magnon race. The association areas appear on the whole to have been less developed, but to Neanderthal Man, as well as to the other races which come after him with their practices of burying the dead, we must attribute a fairly high degree of imaginational ability.

It is evident that man's emotional equipment has changed very little from that found among the simpler stocks. Man today probably has more conflicts, faces more situations capable of arousing emotions than did primitive man; but so far as the variety of emotional behavior is concerned, man of today probably differs very little, if at all, from his very remote ancestors.

In understanding and in thinking we probably have two outstanding ways in which primitive man was inferior to modern man. Until we reach Crô-Magnon Man, the anatomical evidence suggests a lack of a high degree of reasoning ability. Man's brain was not equipped in a

way that would favor much thinking, even though we assume that early man had many problems to think out. In Crô-Magnon Man and in the men of the New Stone Age the necessary brain conditions for thinking were undoubtedly present. Whether they were used to any great degree is quite another problem.

The Modern Man Compared with the Crô-Magnon. On the whole we are quite safe in saying that *in some respects* at least psychological evolution has made little progress during the past several thousands of years. Conklin is probably right when he suggests that since the time of the Crô-Magnon race, "there has been no marked increase in Man's cranial capacity, and probably little or no increase in his inherent intellectual ability . . . the intellectual evolution of the race, no less than the physical, has slowed down until it has practically stopped" (*5*, 163). This may be taken to mean that present day man cannot perceive more sharply, remember, and imagine in greater amounts, understand and think more accurately than did Crô-Magnon Man. This does not mean, however, that, psychologically considered, modern man is identical with Paleolithic Man. While the actual limits of man's psychological abilities may have remained unchanged since the days of Crô-Magnon Man; yet modern man has made greater uses of them along lines quite different from those of primitive man. Modern man, to mention a most outstanding difference between him and early Man, is more socialized. He perceives, imagines, remembers, thinks, acts, and feels more in terms of others; he is more coöperative, more helpful; more group minded. He has learned to work with others. As a result he has come, within a relatively short space of time, to control his environment in a way no doubt undreamed of by early man. The manifold development of agriculture, industry, commerce, literature, and medicine are the immediate results of coöperative action in which division of labor and specialization stand out as significant characteristics. Primitive Man could undoubtedly get along, in some ways, without much aid from others. But it seems to be evident that little permanent progress could take place until he became socialized, lived in fairly permanent groups, and developed traditions, attitudes, and knowledge which could outlive the individual.[1] Today, on every hand the desirable results of coöperation are seen in the control of disease, in the elimination of pests, and in the enforcement of laws and rules of conduct.

[1] "The germs of civilization were planted when Man's attention first became fixed upon specific problems, which he was able to deal with in an experimental manner and, in co-operation with other men, to solve in a way more or less satisfying to him and his contemporaries, and to hand on his solutions of them to those who came after them" (*31*, 120).

The Significance of Extra-Organic Factors in Man's Development. Man's struggle upward has been affected both by internal and external factors. There is reason to believe that much of his progress was thrust upon him by conditions which forced him to be more social. There does not appear to be any particular and innately determined character by virtue of which man has pushed on to reach the heights—to achieve to the degree of control over the environment which he exercises. He had a weak body, but a large brain and a supple hand; he made discoveries, and he profited from them. The development of flint flaking, the use of fire, the breeding of animals, the invention of ways of hardening metals, the evolution of an alphabet, and the adoption of an agricultural and fixed mode of living have served to lift man and set him apart from other animals. To appreciate the profound significance of such factors in determining the level of life, we need but turn to those peoples which presumably split off from the common stock and became isolated before many of such determining factors had become effective. We know that there are groups today to which a knowledge of breeding of animals is apparently unknown. Aside from the dog, some peoples have no domesticated animals. Moreover, in some cases, they have only the primitive tools of late Paleolithic Man. And finally, they know very little about the art of agriculture. Lacking these as well as many other factors each of which has played a part in civilizing man, they remain "benighted heathens." Modern man is a civilized creature. The civilization is not of his body; it is his behavior which is civilized. Civilization has affected man psychologically more than structurally.

Let us consider for a moment the significance of a single factor—that of agricultural pursuits—upon man's psychological development. In his *Evolution of Man,* Elliot Smith states that "the event that wrought the greatest and most far-reaching influence in the development of civilization was the invention of agriculture." Tyler, too, speaks of the "rise of agriculture" as the "real basis of civilization."

Many profound changes in man's behavior have been pointed out as more or less directly attributable to his having abandoned his nomadic habits in favor of an agricultural life. Among the many changes let us consider a few. Tilling the soil served to develop habits of industry, for the preparation of the soil and the necessary cultivation of the crops required more industry than the pursuit of game. Held to his land and waiting for his crops to grow, man became more patient and more settled. Living more quietly than was ever possible under a nomadic type of life, families became larger, groups increased in size, and man had to learn to live more closely with others. Adherence to group stand-

ards of behavior was thus developed. Moreover, the necessity of seasonal planting turned man's attention to the skies. He now had problems to settle which concerned the heavenly bodies. He sought some measure of time, and supposedly he laid in this manner the basis of astronomy, physics, and geometry. In short, some trace the very foundation of human knowledge back to simple agricultural occupations of early Man. Furthermore, agriculture is supposed to have furnished the earliest occasions for the development of a militaristic attitude of mind. Men lacking ease and comfort and knowing that both might be found in the rich lands of others turned to conquest. Possessions of this sort gave power, if in no other way than to supply food materials. Agriculture together with irrigation, as in the Egypt of early days, meant labor. War and conquest caused men to think in terms of slavery. And when slavery came into existence, man's whole psychological fabric became different. To labor was contemptible; to fight was commendable. Thus man became more militaristic in outlook. Finally, the assumption of an agricultural life contributed to man's religion. He created divinities to look after his crops. These deities were mostly females, inasmuch as they were supposed to be productive. Elaborate ceremonies and festivals were slowly evolved to care for such critical times as the planting and the harvesting of the crops. Customs and taboos, too, became centered around plants and animals. And so the story runs. The one fact that stands out from such a study as this is the profound and the far-reaching influence exercised upon the whole psychological life of man through the adoption of one form of industry rather than another.

One clearly realizes that the direction of racial development has been determined, time after time, by some chance turn of conditions extrinsic to the race. A decreased food supply, a decided change in temperature, the discovery of fire, the influx of some foreign stock, the development of a new source of food, the compulsory abandonment of the practice of killing babies, the isolation of a stock by natural barriers, as well as a great many other factors, have served to turn the race in one direction rather than in another. Man has not just evolved; he has been evolved by conditions over which he has had little or no control. Natural selection has played a part in his development, and natural selection means no more than this: the blind play of natural forces upon organisms and the ruthless extermination of those groups which are found wanting. A proper realization of these facts inevitably leads the thoughtful to ponder upon the problem of the future of the human acer.

THE FUTURE OF THE HUMAN RACE

We read a story from the history of man that is fraught with the power to disturb. We read of race after race of men who appeared upon the face of the earth, apparently flourished for a time, and then disappeared to leave, here and there, only their bones as mute evidence that they had ever been brought forth.[1] Is a like fate awaiting the present race? Do we of today, as some students believe, bear within us the slowly developing germs of racial deterioration or perhaps complete extermination? Have we no control over the future of the race? Must we assume that some mysterious and inexorable force, regardless of what we may do, will again sweep the board clean? Many students have given serious thought to such problems, particularly to the future effects upon the race of certain subtle movements and forces at work in the race today. They see these movements and forces as agents which, if permitted full play, would slowly undermine the very foundations of our stock. They are convinced that deterioration, if not complete extinction, inevitably awaits the race if combative steps are not taken. But they are not wholly pessimistic. They agree that nature has equipped the race with the necessary resources for survival, if only proper use is made of them. They point out that through his intelligence man has been given a source of power even greater than that of natural selection. Through the proper use of his intelligence man is offered a way out of any danger of racial deterioration. Intelligence furnishes him with the knowledge of what is necessary and how to proceed. But intelligence must have efficient weapons with which to work. A most effective weapon at hand for this racial work is eugenics.

Eugenics and Defective Stocks. Eugenics has as its real aim the improvement of the human stock—the production of a race that is progressive, not retrogressive; a race that moves upward, not downward; a race that grows and does not decline. Eugenics is a serious attempt to lay bare and to combat the causes of racial decline. The notion back of eugenics is quite old. Centuries ago measures of a truly eugenic nature were widely practiced to an extent undreamed of today. It was quite proper among many earlier peoples, for instance, the early Greeks, to eliminate through exposure and other methods the idiot, the imbecile, the epileptic, the deformed, and the incurably diseased. Such were not permitted to live, breed, and pollute the race. Today, however, a quite

[1] "Few animals," Conklin writes, "have suffered more wholesale destruction than have the more primitive races of Man in different parts of the earth. Several species of Man have become entirely extinct, leaving only, as is generally believed, a single existing species, *Homo sapiens*" (*4*, 290).

different attitude prevails. Unremitting efforts are made to preserve such individuals even though by so doing they and their associates suffer greatly through the years.

There is unquestionably an urgent need for clear-headed, unemotional thinking upon the problem of the perpetuation of proper human stocks. When one realizes the increased numbers of the feeble-minded, the epileptic, the insane, the delinquent, the criminal, the dependent, the pauper, and others who fill our institutions and who represent only a part of the total number of such persons in the general population, one must be struck with the actual necessity of enlisting some effective agent for the purpose of combating any set of conditions which contributes in any way to this vast army of the unfit. It is indeed a striking commentary upon society that we spend less for the education of our normal children than we do for the care of the defective individuals in the various institutions throughout the country. Some authorities have placed the approximate institutional population of the insane and the feeble-minded of our country at 800,000—almost as many as the total number of students enrolled in our colleges and universities.

It appears that under the present conditions of society the undesirable type of individual is on the increase. There are several factors which directly or indirectly contribute to the perpetuation and increase of defective and inferior stocks. Society insists upon keeping alive (and not infrequently permits the breeding of) hopelessly defective and unfit individuals. At times the very worst types are preserved along with the best and given essentially the same chances of reproduction.[1] We have previously pointed out in connection with our discussion of such families as the Kallikaks, the Jukes, and others, the dire consequences to future generations of granting full reproductive freedom to undesirable persons. Biologists have repeatedly stressed the great danger to the future of the race if such stocks are allowed to thrive. One student writes as follows:

> There are millions of men in civilized countries whose mental equipment places them on a plane with barbarians or savages, and they have on the average more offspring than their civilized contemporaries. There are millions of others who are seriously defective in body and mind . . . and yet in many civilized countries they are permitted to perpetuate their kind and produce a never-ending supply of mental and moral defectives, whose maintenance

[1] Conklin tells us that "there has been perpetuation of the worse lines through sentimental regard for personal rights, even when opposed to the welfare of society; and both church and state have cheerfully given consent and blessing to the marriage and propagation of idiots and of diseased, defective, insane and vicious persons."

must seriously interfere with the proper education and development of the normal population and whose unrestrained existence constantly threatens to pollute purer streams of heredity (*4*, 296).

It is widely recognized that society by extending its watchful care over the weak has tended, to a major degree, to free them, and at the same time the race, from the operation of the forces of natural selection. The physically and the mentally unfit individuals are carefully shielded, tended, clothed and fed. Social forces see to it that the undesirable types are actually protected and too often permitted to reproduce at the expense of society. Through laxity, social indifference, mistaken notions of charity, and gross ignorance, the race is being harmed. Thus we find a British Government Commission reporting that in its opinion feeble-mindedness during the last generation "has increased twice as fast as the population." In this country, Downing says that insanity has increased four-fold in the same length of time.

What War Does. War, too, contributes in no small degree to racial deterioration. Draining the best blood away to the battlefields and leaving to the defective and the inferior the perpetuation of the race results in a general lowering of the racial level. Soldiers represent a fairly select group. On the whole they are the pick of the land. Their death unquestionably represents an irreparable loss to the race. Holmes thus refers rather pessimistically to the "highly deleterious influence of modern war, which has not only worked incalculable injury in recent centuries but probably has more evil in store for us" (*11*, 69). Years ago biologists pointed, as a striking example of the bad effects of war, to the destruction of the Teutonic stock through the Thirty Years' War and to the French stock which suffered greatly through the terrific losses incurred during the Napoleonic Wars. But the World War was even more costly. It is estimated that in the recent struggle more than ten million individuals including the very flower of the manhood of the combatant nations were killed. As a result of the death of these millions of men, millions of women have been forced to remain unmarried and childless; and as Conklin points out "the race is made poor for many generations to come."

The Decline of Good Stocks. Inferior stocks are today producing an alarmingly disproportionate share of the population. Pearson, for example, estimates that one-fourth of England's population is producing one-half of her next generation. And this "fourth is that part of England's people most poorly endowed by both biological and social inheritance." It is unquestionably true that there has been a general decline in the birth rate of the better stocks. This decline among the

classes which have been most successful is indeed a serious menace to our racial welfare.[1] In this indirect manner the responsibility of the future of the race is slowly, but surely being shifted from the hands of the more intelligent to the hands of the less intelligent. In Massachusetts, to cite only one instance, the birth rate of the foreign born is about twice that of the native population. The better stock is gradually breeding itself out of existence.

A number of years ago Galton pointed out that the tendency of the better stocks to mate late and to limit voluntarily the number of offspring was bound to result in a few centuries in their being completely dominated by the mediocre or inferior stocks. Consider one or two illustrations. From a study which he made of about one thousand American men of science, Cattell found that family fertility in one generation had been cut in half. The average size of the families of these men was about 2.22, while the average size of their parents' families was about 4.66 children. A statistically minded biologist has estimated that at the present rate of decline one thousand Harvard graduates of today will have only fifty descendants two hundred years from now. But at the same time one thousand Rumanians today in Boston, at the present rate of breeding, will number around one hundred thousand among their progeny.

A further cause for alarm is found in the fact that college graduates tend, on the whole, not to marry or to marry late. As a result, the average number of offspring of such graduates is very small. Thus the average number of children of graduates of Harvard and of Yale for a ten-year period (1881–1890) was about 1.5. The number is even lower with graduates of some girls' schools. "Up to the year of 1901, the average per graduate of Vassar and Bryn Mawr was about .8, of Mount Holyoke, about .7, and of Smith College, a little less than .6."[2] From these data it seems quite clear that the more educated and higher types of women are failing to produce children—a state of affairs which indeed constitutes a very serious loss to the race.

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[1] "There is much in the modern world," one student writes, "that reminds one of the period of decline of former civilizations, and especially of Greece and Rome, and many persons have wondered whether our civilization is not traveling the downward road to a similar end. In both Greece and Rome the decline was preceded by a large amount of race mixture, and a decreasing birth-rate among the higher classes, while it remained relatively unchanged elsewhere. Momsen says that the decay of Rome was due mainly to the 'difference between the fertility of the higher and the poorer classes'" (5, 179).

[2] The following table taken from Nearing gives some notion of the average number of children produced by married graduates of Vassar, Bryn Mawr, Wellsley, and Mt. Holyoke:

Birth Control. Closely related to the problem of a declining birth-rate is the problem of birth control. Within recent years a very definite tendency toward a strict limitation of the size of the family has become manifest. The knowledge and the employment of means of limiting the number of offspring is more restricted to those who are best fitted, biologically and culturally, to rear large families. Thus birth control does not serve to prevent the production by those individuals who should not have children, or by those who should have few children. Birth control among those stocks in which feeble-mindedness, pauperism, criminality, and other undesirable characteristics occur in disproportionate numbers and in which its exercise would materially contribute to the general raising of the racial level is less frequently practiced. These stocks only too often have more children than they themselves can possibly rear, while those stocks which could easily rear many children fail to produce them. It would appear that the acquisition of education and wealth actually results in a sharp limitation of family numbers. Perhaps the desire for comfort and the wish to enjoy freedom from care of children, together with the possession of the actual means of achieving these goals, act as powerful motives against child production. Of course, gross ignorance and indifference, as well as religious beliefs must not be overlooked as contributory conditions in the production of large families among the poorer groups.

Racial Crossing. Another factor contributing to a general lowering of the racial level is the production of inferior offspring through racial crossings. Unrestricted immigration and inter-marriage among some races may serve to introduce weak elements into an otherwise strong stock. Where large numbers of those races which have shown little tendency to be industrially and intellectually productive mix with more productive races, harm may follow. The race may be mongrelized. It does not mean at all that all racial crossings are undesirable, for in fact some such mixtures are highly desirable. It does mean, however, that some hybrids are apparently inferior to the parent stock. Thus a common criticism of the half-breed by those who condemn racial

College	Children per 100 Married Graduates			
	1870–79	1800–89	1890–99	1900–09
Vassar	207.8	167.3	147	68.8
Bryn Mawr	. . . .	. . . .	171.5	71.4
Wellsley	. . . . .	166.1	110.1	. . . . .
Mt. Holyoke	. . . . .	. . . . .	182.3	91.2

crossings is "That he has all the vices of both races and the virtues of neither."

THE PROGRAM OF EUGENICS

Galton's Plan. Galton was the founder of the modern eugenic movement. He became convinced from his studies upon mental inheritance that racial improvement was bound to result if superior family stocks could be induced to reproduce at a more rapid rate than the inferior family stocks. He therefore advocated the encouragement of early marriage and the production of large families among the superior. No doubt Galton was right, but both of his suggested means have been seriously interfered with by our present educational and social systems. The professional preparation of the individual of the better classes today demands that he spend a good many of his sexually productive years in study. He cannot marry until fairly late. As a result women, too, marry relatively late.[1] And late marriages generally mean a greatly reduced number of children. Eugenics proposes several means of achieving its goal. Among them we find the following: (1) the creation through education of public sentiment in favor of eugenical measures; (2) segregation and sterilization of the unfit; (3) production of large families among persons of ability; (4) elimination of war; (5) selective mating; (6) birth control of the proper sort; (7) control of immigration. Of these we can consider here only the first two.

Education. The eugenicist believes that when the public becomes properly informed concerning the dangers of certain types of human mating, most of his troubles about the future of the race will be settled. He believes that when the general population becomes awakened, man will employ as much intelligence in the selection of his mate as he now does in the selection of domestic stocks—animal and plant. One student puts the matter in this way: "A generation ago one might have taken a chance in marrying into a family displaying many cases of tuberculosis or insanity, for then next to nothing was known about inheritance. But now we know the inevitable consequences of such rashness" (Downing). So long as gross ignorance concerning the more elemental phases of inheritance prevails, little improvement can be expected; but given knowledge of causes, we may look hopefully to the population at large for some control over the forces operating toward racial deterioration. It will be a long time before romance is banished; and, perhaps, no one feels that mating without it would be wholly desirable. But it is indeed

[1] One writer points out that in the general population, 90% of the women of this country marry before 40; only about 50% of the college women are married at that age.

a questionable sort of romance that feeds blindly upon propinquity. Romance may well flourish even where some intelligent guidance is exercised in the selection of the person releasing romantic behavior.

Segregation and Sterilization. In these two methods, students of race improvement find the surest ways of preventing the propagation of undesirable types such as the epileptics, the feeble-minded, the incurably diseased. The segregation of such in institutions in which proper treatment may be received tends to ameliorate their life conditions and at the same time prevents the production of like offspring. They are permitted to live and enjoy life, but they are deprived of the power of passing on their deficiencies to future generations. Segregation is practiced to a limited degree in many states and countries, and in time the results of such restriction on breeding will become manifest. Full segregation of the estimated 500,000 feeble-minded of our own population would alone entail great expense. But the greatest expense would be rather temporary. The number would be considerably reduced in the first generation. Fisher estimates that about 11% of the feeble-minded of any generation are to be attributed to the mating of feeble-minded individuals of the previous generation. The remainder (89%) of them come from matings of individuals in whom feeble-mindedness is carried as a recessive trait in the germ plasm. With control, each generation would see a gradual reduction of these carriers. The wholesome effects of proper segregation have been clearly shown in the case of the cretins of the Aosta Valley in northern Italy.[1]

Sterilization of the undesirable avoids the necessity of institutionalizing the individual and prevents further propagation. The removal of a small section of the sperm duct in the male or a portion of the Fallopian tubes in the female results in complete sterility without any significant bodily effects. More than one-third of the states have passed laws providing for sterilization of certain types of individuals.[2] Walter points

[1] "In the city of Aosta the goitrous *cretin* has been for centuries an object of charity. The idiot has received generous support, while the poor farmer or laborer with brains and no goiter has had the severest of struggles. In the competition of life a premium has thus been placed on imbecility and disease. The *cretin* has mated with *cretin*, the goiter with goiter, and charity and religion have presided over the union. The result is that idiocy is multiplied and intensified. The *cretin* of Aosta has been developed as a new species of man. In fair weather the roads about the city are lined with these awful paupers—human beings with less intelligence than a goose, with less decency than the pig" (*35*, 254).

[2] In 1926, the following 18 states made mandatory by law the sterilization of those persons unfit for parenthood: California, Connecticut, Delaware, Idaho, Iowa, Kansas, Maine, Michigan, Minnesota, Montana, Nebraska, New Hampshire, North Dakota, Oregon, South Dakota, Utah, Virginia, and Washington. Of these states, California has sterilized approximately 5,000 individuals.

out that could such laws be generally enforced in "the whole United States, less than four generations would eliminate nine-tenths of the crime, insanity and sickness of the present generation in our land. Asylums, prisons and hospitals would decrease, and the problems of the unemployed, the indigent old, and the hopelessly degenerate would cease to trouble civilization" (*35*, 255). The saving in terms of dollars would be enormous. In 1915, the whole United States spent $75,000,000 for the care of defective and delinquent types. For one year (1927–28) New York set aside approximately $33,000,000 for the care of the feeble-minded, insane, criminalistic, epileptic, blind, deaf, pauperous, and other institutionalized and socially aided classes. Since most of these individuals apparently contribute nothing to society, money spent in this manner is largely "wasted."

A FINAL WORD

We have followed the lineage of the human being from a simple mammalian creature up through the Primate series. We have found that many races have lived prior to present man. During the time that *Homo sapiens* has occupied the earth, no significant changes in bodily constitution have occurred. Many of the selective forces which earlier helped to produce man, appear to have become inoperative. Man is no longer evolving biologically. It may be that man has actually reached the *limit* of his biological development. His brain is better than that of all other animals, but it does not seem to be increasing the limits of its functional capabilities. While his biological development has apparently changed little for thousands of years, his psychological abilities, in some respects, have steadily developed. He has, for instance, grown more socialized.

Because man has carefully protected the unfit in his midst, thus nullifying the forces of natural selection, he tends slowly toward decline. The race is suffering from the effects of civilization; it stands in need of something to take the place of natural selection. The eugenicist claims that through proper guidance, involving the intelligent selection and perpetuation of stocks, the race is able to maintain itself, biologically and psychologically.

The progress of the race depends also upon cultural or social factors. To the degree to which man is able to control the direction of his social development, he is provided with an effective agency for directing his destiny. And we are led to believe that the determination of our social evolution rests in a large measure upon our own decisions. Through

proper education, control of disease, desirable legislation, right mating, we may actually modify the course of racial development. Kellogg, for instance, points out that the problem of the future of the human race "both societal and biological, is a problem of which man holds the solution very largely in his own hands." It is, then, to the *development* of the social side of man's nature that we may look to the future. The process of evolution has definitely shifted from the biological to the social plane. As man grows more and more socially-minded, he tends to look more and more from the individual to the group. Social efficiency instead of individual or biological efficiency becomes the watch-word. Man apparently has the psychological capabilities for doing things on a scale infinitely greater than anything which he has yet done; whether he goes up or down appears to depend greatly upon the extent to which he becomes socially and racially minded.

BIBLIOGRAPHY

1. Boas, F., *Anthropology.* 1928.
2. Cattell, J., "Families of American Men of Science," *Pop. Sci. Mon.*, 1915, *86*, 504.
3. Conger, G., *New Views of Evolution.* 1929.
4. Conklin, E., *Heredity and Environment.* 1922.
5. ————, *Evolution of Man*, ed. by Baitsell. 1922.
6. Fasten, N., *Origin through Evolution.* 1929.
7. Flower, W., and Lydekker, R., *Mammals.* 1891.
8. Haldane, J., *Organism and Environment.* 1917.
9. Hegner, R., *College Zoölogy.* 1912.
10. Holmes, S., *The Trend of the Race.* 1921.
11. ————, *Studies in Evolution and Eugenics.* 1923.
12. Gregory, J. W., *Creation by Evolution*, ed. by F. Mason. 1928.
13. ————, "Did Man Originate in Central Asia?" *Sci. Mo.*, 1927, 385.
14. Jennings, H., *Biological Basis of Human Nature.* 1930.
15. Jones, F., *Arboreal Man.* 1916.
16. Keith, A., *Man, a History of the Human Body.* 1912.
17. ————, *The Antiquity of Man.* 1915.
18. Kellogg, V., *Evolution.* 1924.
19. Lull, R., *The Evolution of the Earth and Its Inhabitants.* 1918.
20. ————, *Organic Evolution.* 1917.
21. ————, *The Evolution of Man*, ed. by F. Baitsell. 1922.
22. Mason, F., *Creation by Evolution.* 1928.
23. MacCurdy, G., *Human Origins.* 1924.
24. Nearing, A., "Social Decadence," *North Amer. Rev.*, 1913, 629.
25. Newman, H., *The Nature of the World and of Man.* 1926.
26. Osborn, H., *The Origin and Evolution of Life.* 1917.
27. ————, *Men of the Old Stone Age.* 1915.
28. Read, C., *Origin of Man.* 1925.

29. Shipley, A., and MacBride, E., *Zoölogy.* 1904.
30. Smith, G. Elliot, "Primitive Man," *Proc. Brit. Acad.*, 1915–16, 455.
31. ————, *Evolution of Man.* 1924.
32. Sonntag, C., *The Morphology and Evolution of the Apes.* 1924.
33. Thomson, J., *What Is Man?* 1924.
34. Tyler, J., *The Coming of Man.* 1923.
35. Walter, H., *Genetics.* 1913.

CHAPTER VII

THE PSYCHOLOGY OF INDIVIDUAL DEVELOPMENT

All the world's a stage,
And all the men and women merely players.
They have their exits and their entrances,
And one man in his time plays many parts,
His acts being seven ages. At first the infant,
Mewling and puking in the nurse's arms.
Then the whining school boy, with his satchel
And shining morning face, creeping like a snail
Unwillingly to school. And then the lover,
Sighing like a furnace, with a woeful ballad
Made to his mistress' eyebrow. Then a soldier,
Full of strange oaths, and bearded like the pard;
Jealous in honor, sudden and quick in quarrel,
Seeking the bubble reputation
Even in the cannon's mouth. And then the justice,
In fair round belly with good capon lin'd,
With eyes severe, and beard of formal cut,
Full of wise saws and modern instances;
And so he plays his part. The sixth age shifts
Into the lean and skippered pantaloon,
With spectacles on nose and pouch on side,
His youthful hose, well saved, a world too wide
For his shrunk shank; and his big manly voice,
Turning again toward childish treble, pipes
And whistles in his sound. Last scene of all,
That ends this strange eventful history,
Is second childishness and mere oblivion,
Sans teeth, sans eyes, sans taste, sans everything.

—*Shakespeare.*

INTRODUCTION

It is easy to love individuals, but extremely difficult at times to understand them; for we are undoubtedly emotional long before we are intellectual and thoughtful. Of the many psychological problems concerning the individual the one which presents, perhaps, the greatest difficulty to our understanding is genetical or developmental in character. Individuals unquestionably develop; yet it is extremely difficult to lay bare the nature of this process. Every adult individual clearly stands as a striking illustration of the product of a very complex process of psychological and biological evolution. Wherever we turn we find in-

dividuals daily, monthly, and yearly changing in terms of weight, stature, facial features, degree of skill, ability to understand, intellectual and emotional attitudes and desires. But it is not an easy task to secure straightforward descriptive accounts of the successive changes which occur throughout the entire life of the individual. A full story of the psychological development of the human being covers his whole life span; for the changes which are so evident during those periods in which the individual turns his back upon infancy and advances through childhood and adolescence into maturity do not alone constitute his life history. The individual, we say, continues to change or develop even through the long, bleak, "useless" years of senescence. Thus, he advances from the moment of conception until the time of his death along a path marked by constant change. Never for a significant length of time does he stand still. At all times he is either growing or declining.

Of the nature of a great many of the biological and psychological changes constituting an individual's development, little is known; and of what is known we can give only brief glimpses. We are forced to omit long periods. We attempt to treat with the human individual in his extreme developmental moments; that is, during the periods of his childhood and his senescence. We leave aside for other times a discussion of those changes induced in the individual through formal training in the class room as well as those which are commonly known as socialized behavior.

The Nature of Bodily Development. The individual organism obviously develops by changes in its size and in its form. It matures by general enlargement of its structures or parts. But this increase in size is very closely accompanied by striking changes in bodily contour and pattern. The human organism does not develop in any sense after the manner of some slow, swelling-up process of each of its parts. An adult is not an enlarged or overgrown child. Certain features appear to exhibit more rapid development than others. Because of this differential rate of growth of particular bodily regions, the form of the individual necessarily changes from time to time. The development of each gross part of the organism seems to proceed according to some intrinsically determined order. That is to say, the rate of growth of the whole organism seems to rest to a major degree upon internal, rather than external conditions. There are regulatory forces operative in growth which appear to be fairly independent of such factors as food, climate, temperature, and the like. As Kirkpatrick says, "Each part appears to develop according to an inner law of its own." The following figure shows in a very striking manner the relative changes in bodily structures

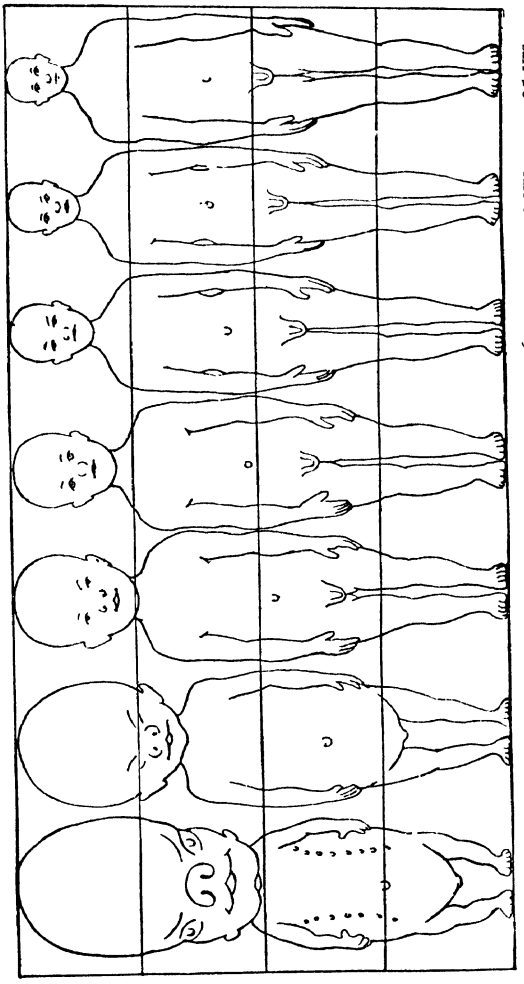


FIG. 27. A comparative view of the human being during several stages of development. This figure shows quite clearly that the child is not an undersized adult. From Morris, *Human Anatomy*. By permission of P. Blakiston's Sons and Company.

from the fœtal stage of the human organism to maturity. Imagine how the human adult would appear, if growth or development were merely an enlargement of the child! (See Figure 27.) Here is clear evidence that the child is certainly not a small edition of the adult. It unquestionably has its own unique characteristics.

A comparison of the child with the adult in terms of size, height and weight reveals that the development of some of the bodily parts proceeds in the following manner: The weight of the brain increases about four times; the heart increases in weight about thirteen times; the lungs increase their weight about twenty times; the length of legs increases about five times; the length of the head doubles; and the length of the body increases about three times. When the whole organism is considered, we find that there are very slight differences between the sexes in terms of height and weight. There is, however, no apparent difference in variability. From a study of two thousand individuals, Hollingworth and Montague report the data in Table III upon height, weight and variability. Baldwin reports that the average weight for white boys at birth is eighty-five grams less than for white girls. Colored boys are slightly heavier than colored girls.

> The range of distribution is from eighteen hundred fourteen to fifty-four hundred forty-three grams for the white boys and from eighteen hundred fourteen to sixty-three hundred fifty grams for the white girls; for the colored boys the distribution is from eighteen hundred fourteen to forty-five hundred thirty-six grams; for the colored girls from twenty-two hundred sixty-eight to fifty-eight hundred ninety-seven grams (*3*, 36).

Psychological Changes in the Individual. Development, psychologically considered, proceeds by a change (increase or decrease) in the number and in the refinement of the various activities. The creature which at first neither perceives nor desires much and is practically helpless, gradually turns into an organism able to perceive extremely small differences, to manipulate its bodily members and environmental objects in a highly versatile manner, to transcend present time and perceptual space by way of memory and imagination, to exhibit a highly diversified emotional life and, finally, to create through thinking unique environmental situations and settings to which it may delay its responses for a great many years. The process of functional refinement is marked, as we see so clearly illustrated in the case of habituation, not only by the addition of many new items but by the elimination of old components. While an individual never actually outlives his history, he apparently puts aside, with the passing of the years, many of his

previous ways of perceiving, acting, feeling and thinking. The adult ceases after a time to be childish; and then, curiously enough, toward the end, he may put aside, at least to a certain degree, his more mature ways and again exhibit behavior of a sort which might be best described as a mixture of the infantile and the mature. Psychologically speaking, the individual is not exactly a child again; yet the person of previous

TABLE III

SHOWING CERTAIN PHYSICAL CHARACTERS OF MALE AND FEMALE AT BIRTH

FEATURE MEASURED	GIRLS			BOYS		
	Average	A. D.	A. D.† Per Cent	Average	A. D.	A. D. Per Cent
Weight, in grams	3221	381	.118	3358	397	.118
Length, centimeters	49.9	2.27	.045	50.5	2.35	.046
Circumference at shoulders, cm.	33.8	1.88	.056	34.1	1.90	.056
Skull, bitemporal diameter, cm.	7.47	.72	.096	7.56	.72	.095
Skull, occipito-frontal, cm.	11.2	.59	.052	11.3	.59	.052

years is missing. The keen perceptions, the quick grasp of meaning, the facile imagination and the glow of emotional fervor no longer exist. The whole range of psychological abilities appears decidedly to have waned. One is strongly reminded of Tennyson's poetic picture of the emotional decline in old age.

"Gone the fires of youth, the follies, furies, curses, passionate tears,
Gone like fires, and floods, and earthquakes of the planet's dawning years."

During the remainder of our general discussion of the problems of individual development we shall be mainly concerned with the more outstanding psychological changes in the human being as it passes through childhood and old age. It is recognized that this division is wholly arbitrary and inadequate so far as a complete description of an individual's development is concerned. It is impossible to treat in one chapter of a lifetime of change. We know that an individual is not today a child and tomorrow an adult. We may read, it is true, of persons who come overnight to solid maturity; but we believe that there is more romance than reality in such accounts. Growing up is a slow process. Development, regardless of interruptions from the inside or outside, is always continuous and unbroken. It cannot be divided into sharp

†A. D.: Average deviation.

stages. The direction, however, is undoubtedly changed from time to time under changes in the environment. We know that leaving home and going to school, moving from farm to town, falling heir to great wealth, becoming engaged, losing some cherished position, growing poor, may profoundly influence the direction of one's development. We know likewise that profound glandular changes may alter the direction of one's psychological development. We wish, now, to consider the methods of securing information about the development of the individual.

METHODS OF STUDY

The Diary Method. What are the methods by means of which we may properly study the developmental changes in the child? Since the child is essentially animal-like in its earlier life—at least, in so far as it lacks the ability to report or to comment on its behavior—we might study it much after the method of animal psychology. As we shall later show, various students have made use of just such methods of study. Some have employed the so-called diary method, which corresponds roughly to the naturalistic way with the animal. Under this procedure the observer of a child's behavior records, from day to day, certain activities of the child.[1] Because of the lack of experimental restraint, this method gives access to a certain type of behavior unobtainable in any other manner. It is of especial value when used to supplement the data obtained under the more rigid and more "artificial" conditions of experimental control. The value of such reports rests to a certain degree upon the proper selection made among the many possibilities offered, upon the problem or the purpose of the investigator, and upon the attitude of the observer. In addition, there is the actual ability of the person to observe. If he is inclined to confuse fact with

[1] The diary if properly kept may have a very important value in many respects. It may furnish the material for an understanding of many behavior problems which subsequently develop from earlier situations. As an illustration, we quote the following, "Two little girls were playing together at the side of a fireplace. One of them caught fire and was burned to death. The other child, who was only three years old, seemed to be very little affected by the tragedy. The child who was burned was carried immediately out of her sight, and the little girl had, of course, at that time, no conception of death.

"In later years this child developed a definite neurotic tendency with regard to fire, which was laid to this experience. A study of the situation, however, showed that the neurotic tendency was due to the fact that *from this time on* the mother had been very much terrified by the child's slightest approach to the fireplace, and had taught the fear to the child as she developed. In other words, it was the mother's attitude with regard to the accident and not the child's that was the determining factor in the neurosis. A diary describing exactly how the child had behaved would have helped to straighten out this point" (*8*, 239).

inference, the value of his reports is greatly impaired. One form of this method is to take, at regular periods, a very detailed statement of what an individual does over a period of five minutes, an hour, or a month. Or motion pictures may be taken of the individual's behavior at different age levels. These may then be compared to give a clearer notion of the growth and decline of behavior patterns.

The Mental Test. A second method of studying the development of the child which has considerable value is the mental or psychological test. By this means an attempt is made to secure an objective measure of the individual's ability to perform certain specified tasks. He may be asked to tap the same blocks touched by the experimenter. He may be required to draw or to trace certain patterns. He may be set the task of naming objects; or, at a little later period, of solving problems. The test method attains its greatest significance when the results are carefully considered in connection with other forms of data bearing upon the child's abilities.

The Psychoanalytic Method. The psychoanalytical method is another way of studying the child. It seeks to determine the origin of human activities, particularly of the undesirable sort, in terms of repressed memories of some "injury" or of some thwarting of needs or desires. The individual suffers some accident or undergoes some experience. The incident may be wholly forgotten; but the power to disturb, modify or color the individual's life may remain. The strange fears, the curious desires, the intense longings, the strong aversions, and the insistent compulsions toward certain actions, as well as many other phases of life which crop up on every side, are frequently to be attributed to particular events of the individual's earlier life. The study of the child may throw light upon the formation of these attitudes and activities.

The Experimental Method. On the whole, the "best" method is perhaps the experimental. Here careful control is exercised over the conditions of stimulation. Within recent years a fairly large number of studies of an experimental sort have been made upon the psychological activities of the child. Through the employment of such means much valuable information concerning many problems of child development has been secured. We shall refer, from time to time during the remainder of the chapter, to the results of certain such studies upon the child.

The data on behavior patterns obtained by all these methods may be compared with a view to securing some comparative notion of the psychological abilities of the individual at various stages. The ob-

servations made upon a child at ten days of age may be compared, for example, with those taken following a thirty-day or a ninety-day period. In this way we may derive a greater understanding concerning the order and appearance of new functions, or of quantitative changes in the old. The child today, we say, is unable to perform in a given manner. Ninety days hence the performance is carried through without failure. In this way we may block off roughly the period at which some new behavior pattern definitely appears. Or, the child at the end of a six month period may perform two or three times more efficiently than it did at the beginning of the period. The change is purely quantitative. Let us now look at the psychological characteristics of the child as laid bare by the use of these methods.

PRENATAL CHARACTERISTICS

Embryonic Behavior. Accurate observation upon prenatal movements is well nigh impossible. Probably the most fruitful means of getting at these early behavior patterns of the child is offered in cases of premature birth. If the child under such conditions lives long enough, it may be given simple tests. It has been found, for instance, that mouth movements under stimulation of the tongue may be elicited as early as the third prenatal month; and by the end of the fifth fœtal month symmetrical movements of the arms and the legs as well as a few other simple responses occur. Nothing, however, approximating the behavior of the child a short time after birth is found. On the whole, we can say that the neurological elements which later provide for the various psychological functions appear to be laid down at birth. That is, the total number of the neurones and their approximate distribution are determined by the end of the ninth fœtal month. But the thousands upon thousands of connections which make possible the production of delicate movements, accurate perceptions, exact memories, and the like do not exist. They are the product of later neural growth and activity. Birth itself thus appears to add nothing neurologically to the child. It is, however, a profound environmental change and it is freighted with tremendous psychological possibilities. It is a change from a liquid to an aërial medium. This change appears to initiate breathing and a new way of securing nourishment and to permit an untold number of new stimuli to become effective upon the organism. To use an analogy, birth is like passing from a light-proof, sound-proof room into the busy world of the market place at noon. As Stern puts it, "The child is moved from his dark, quiet, warm prison into the wide world with its overwhelming variety of manifold stimuli."

Prior to birth, all things—for instance, the materials required for its maintenance and growth—are brought to the child. Following birth this is somewhat changed. Many of the child's needs, it is true, are satisfied by the same process of bringing things to him; but many of them apparently go unsatisfied. As the child grows older this is increasingly true. He now finds that he is forced more and more to go after things. The world ceases to be centered about him. Because things are no longer brought to him as they formerly were, the child gradually extends its world through its quest for the *things-which-satisfy*. Failing to secure the object of its quest the child may suffer serious conflict. Upon a proper solution of these early conflicts, so we are told, much of the psychological integrity of later years appears to hang.

POSTNATAL CHARACTERISTICS

The Nervous System of the Child at Birth. Judging from its behavior the infant possesses very few specific neural pathways from receptor organs to the effector apparatus. At birth a great many of the nerve fibres are still unmedulated. A large number of the neurones connecting the various parts of the central nervous system, particularly the sensory and motor areas of the cortex, do not function nearly so efficiently as later. They, together with the projection fibres which join the cortical region to the lower neural centers and to the muscles and glands, remain for a time in a partially immature state. A great many of the synaptic connections which serve partly to determine the direction which a nervous impulse takes are non-functional. As a result there is evident interference in neural conduction and in effective behavior. In this way we partly account for the almost total lack of control and coordination in the very young child. At birth it is the most helpless of all creatures.

Most of the receptor organs are clearly functionable shortly following birth. The child appears to have many inlets into its central nervous system, but very few specific outlets. The somewhat elaborately diversified receptor mechanisms appear to converge into a few simply organized, final, common pathways. The behavior of the child at this period is quite similar to that of some of the simpler animal forms. Writing of animal development, Herrick says: "In the process of differentiation the sense organs are structurally adapted to respond in a selected way to a great variety of external stimuli at a stage when the motor apparatus is so simply organized that there is possible but little variety of mode of response to these excitations" (*20*, 43). From his studies upon infant behavior, Weiss tells us that the early movements of the

human being are not closely related to particular stimuli, "in the sense that only one specific movement follows upon specific forms of stimulation. We can almost say that when the stimuli are not too strong, any movement may follow upon any stimulus" (*44*, 456). Among the several behavior patterns of the newborn child we find such as sneezing, yawning, grasping, clinging, sucking movements when hungry, swallowing, spasmodic eye closures, roving movements of the eyes, slow movements of bodily members, fanning out of the toes, and head turning particularly when stimulated around the face. Many of these movements are at first quite slow, as if the child were utterly fatigued or numb with cold.

The Behavior Is Random. Many of the early infantile movements may best be described as random activities. They are, we say, "spontaneous." In this connection, Kirkpatrick points out that, "many animals and especially young children make a great many movements which seem to be of a chance character. Often they are instinctive movements only slightly specialized to meet a situation. These combine with and modify the more definite instinctive movements, and in a more or less chance way, one of them brings favorable results and is then selected for repetition and specialization" (*26*, 77). When we say that such movements are spontaneous, we mean that they apparently result either from physiological changes within the organism, such as are associated with hunger, colic, thirst, and nausea; or from the tendency of a stimulus to involve a major portion of the central nervous system and the effector mechanism, so that the whole organism is thrown into activity. "Random" or "spontaneous" behavior is merely response internally, rather than externally, determined. We call behavior *random* because it has no immediate utility or significance. We do not know the stimulus for it.

Early Reflex Actions. It must be understood, however, that some of these patterns may be repeatedly initiated under proper conditions of external stimulation. Because of the regularity of their appearance they possess the essential characteristics of reflex action. Some of these early patterns are of interest to the psychologist because they are, presumably, modes of behavior possessing racial significance. The grasping and clinging movements which appear in most children and by means of which a newborn infant may actually be lifted from its bed may be interpreted as being vestigial functional devices comparable to useless bodily structures, such as the appendix and the tail bones. Long ago Romanes, it is said, suspended young children in this manner from the limbs of trees in his orchard. It has been shown that some

infants, an hour of age, may suspend themselves from a rod for a period of time approximating a minute. An interesting aspect of the clinging response is that it usually disappears at the age of three or four months. Certain of these movements, particularly the grasping and the fanning out of the toes (Babinski reflex) are said to possess diagnostic value. The fact that they persist unduly long in the child may be taken to indicate a disturbance in the neural pathways controlling behavior. The individual, so it is claimed, is more likely to be abnormal than children in whom such movements disappear earlier.

The eye movements of the young child are interesting. The eyes appear, at first, to move quite sluggishly and without apparent reference to sources of external stimulation. Within a short time, either through the maturation of bodily structures or through training (or both), the child comes from a blank staring into space or an aimless wandering, to fixate and to cling momentarily to a stimulus source upon which its eyes chance to fall. During the second stage of this phase of development the child, according to Preyer, turns both head and eyes to some object and fixates it for a short period. In the beginning, these periods of "intent" regard seldom last more than a few seconds. The third stage is marked by the child's ability to maintain its head in one position but to turn its eyes to fixate upon an object and follow its movements. The child usually passes through these stages in about three months. About this time the child starts to make questing movements with its eyes. It looks about for objects and holds its eyes upon them—at first for short and gradually for longer periods.

An interesting phase of ocular control appears by way of the coördinated movement of the two eyes. Some persons become greatly alarmed upon seeing the one eye of the child traveling in one direction, while the other eye moves in a different direction. "One eye may roll up, the other down; one eye turns to the right, the other to the left; one rolls, the other remains stationary, and sometimes . . . they seem to try to look into one another" (Major). The young child in this respect is much like the chameleon which under excitement appears to lose partial control over its bodily parts. Its two sides fail to work coöperatively. Within approximately two months, under usual conditions, all traces of such eye behavior in the human organism disappear, but for a little while longer—should the individual become unduly or widely stimulated—a certain degree of ocular coördination is lost. The eyes again move somewhat independently.

As helpless as the child is at birth, if laid upon its face, it will succeed in turning its head until it frees its mouth. Some would explain such

behavior of this sort as due to the operation of an instinct of self-preservation; others would consider it merely as a form of reflex action. We need assume here nothing more than random activity under suffocation. Just as an unconscious adult will roll about in his struggles to breathe, so the child struggles and squirms with his whole body until his mouth is free.

In sucking we come to one of the most characteristic and perhaps the most complicated of the several forms of infant behavior. There is, moreover, a moderate degree of specificity in sucking behavior that is interesting. The average infant is immediately able at birth to take nourishment by sucking. There may be a short period, it is true, of a few minutes; or, in the case of some babies, a longer time during which many unsuccessful movements may be made.

This behavior of sucking is likewise evinced in infants without a cortex. The child described by Edinger and Fischer also "took the breast at once, and suckled properly from the beginning." A certain difference between normal children and idiots, especially those lacking a cortex, seems to be indicated by the fact that normal children perfect the act in so short a time that, as Preyer reports, it takes place with machine-like regularity after about two weeks. According to the observations of Sollier, no improvement in the performance is observable in cases of congenital idiocy. The response appears, says Sollier, as though it were each time new to the infant. As for the child without a cortex reported by Edinger and Fischer, it ceased to take the breast altogether during the sixth week of its life, and was thereafter fed with a spoon. But during the fourth month, while feeding it in this manner, the attentive mother noticed that the child made slight movements of sucking, which suggested that she should try it with a bottle. This proved successful; moreover, the child would suck the bottle only when there was milk in it (*27*, 88).

The Psychological Significance of Sucking Behavior. In the behavior of sucking we have a very pretty illustration of a fundamental psychological principle. We see here the utter dependence of activity in one region of the organism upon processes simultaneously operative in other, and fairly remote, parts of the organism. In other words, we have clearly shown the significance of the whole organism in activity. As the stomach slowly fills, the child which a few minutes before vigorously took food, begins to slow down. It may stop its feeding behavior and squirm about; or a little later, look about. It may again take nourishment, or it may lie quietly in the position for taking nourishment but still refuse food; but a moment later it may resume feeding activities. It simply means that processes going on in the stomach produce a change in the behavior pattern of the lips, tongue, cheeks, or the mouth. But

since the stomach is joined to the mouth by the nervous system, we discover the central nervous system playing its part in determining behavior. The "hunger," we say, is not in the stomach; it is intraneural. The nervous system is the medium, as shown in this case, by means of which changes in one part of the organism are reflected in other parts. We might say, perhaps, that the stomach changes cause the organism through its nervous system to become more or less sensitive to stimuli of a certain type applied to the face.

When the organism is especially tuned through hunger, a wide variety of objects will release "sucking" movements. Here we are strongly reminded of the behavior of young rats when deprived of nourishment. They crawl slowly about "sucking" at straws, bits of wire, at each other's bodies, tails, and so on. The animal, we point out, is so organically tuned that almost any object in contact with its head releases sucking behavior. It is of interest to observe that a calf, too, will suck vigorously at the finger of a human being for a time and then refuse it. The stimulus in such cases is obviously not chemical or olfactory; it is purely mechanical. The chicken, according to Kirkpatrick, when hungry is tuned to peck "at any small object that is clearly differentiated from its surrounding, whether it be a particle of meal, the eye of its mate or its own toe."

In the case of the child, contrary to the usual opinion, milk is in no sense the necessary stimulus for sucking behavior. The child, also, will "suck" its fingers, its hands, the fingers of another, and so on. It is significant that a child even after having fed to repletion tends to "suck" its fingers or fist. Here is an apparent way of satisfying itself that in terms of an alleged feeding instinct might well be counted as a perversion. The individual is securing undue satisfaction in a manner that has no biological utility for the organism. Many objects, including even its clothing, put into its mouth, elicit sucking movements. A certain degree of stimulus specificity is, however, required. Unusually large or small, hot or cold objects are not effective stimuli for such behavior. Finally, while the end presumably remains the same,—*viz.*, satisfying itself—there is little stereotypy in the actual behavior of sucking. The movements are different under different states of the organism, when objects of different sorts are being sucked, with changes in the type of milk, or with differences in the rate of flow of milk.

Crying Only One Part of Total Pattern. In crying, we have another bit of characteristic behavior released under the most diverse conditions, both internal and external to the organism. The first cry is usually the birth cry. Some would make of it a "cry of wrath at the catastrophe of

birth"; others would have it "a cry of protest at the indignities rudely thrust upon it." In many cases, at least, the individual starts his existence with a cry. Some, apparently, read a great deal of significance into the crying of children. We hear repeatedly on every side that the child instinctively cries. Now we wish to point out that this means very little, if anything. We might just as well say that the child instinctively throws its right leg about in many directions, or its left arm around, or twists to the right and squirms to the left, makes a great many funny faces and so on. We easily perceive that the young child, when it cries, is generally active. All parts of its organism are going: its legs, arms, face, and its vocal cords. Weiss writes as follows of a moment of active behavior in the child:

> The infant is writhing, throwing himself about, kicking, slashing, howling, and expending an amount of energy which almost taxes the capacity of the recording device. It means that under certain conditions of intra-organic and extra-organic stimulation, neural energy is very widely released over the central nervous system of the individual. Most, if not all, of the musculature of its body is, in turn, involved. Among the many muscles thrown into operation are those which control the vocal cords. Thus crying results. Weiss aptly points out that "in the newborn infant, sounds seldom occur without bodily activity of some kind. Even the cry that precedes the violent hunger reactions does not begin until after the movements of the bodily restlessness have started. . . . At first crying is only the accompaniment of violent bodily movement. Later, sounds accompany not only violent movements, but movements which require less bodily energy (*44*, 464).

Because crying is more disturbing to the adult than all other forms of behavior, it is singled out and labeled as instinctive. It becomes an "innately determined signal for help." But we know that the child may cry because of a full stomach as readily and as vigorously as it does because of an empty stomach; although the crying will be different. In the former case the diaphragm is pushed up, thus preventing the same play of the lungs that we find where the stomach is empty. Moreover, the child will cry when it is tired, when it is sleepy, when it is too cold or too hot, and so on. To call this same response to many and diverse situations, instinctive, does not add in the least to our understanding of child behavior. It may be misleading in that it actually serves as a pseudo-explanation. We know that the child is very rapidly conditioned with respect to crying behavior. If it is picked up, rocked, carried, or fed when it cries, its behavior quite quickly becomes modified. It seems shortly to realize the significance of such behavior. But the mere throwing of its legs about seldom brings relief. As a result, the one form tends to be perpetuated; the other tends to drop out.

The Child's Locomotor Activities. We do not need to posit a particular instinct for crying; neither do we need one to understand locomotor activities. Consider for a moment the youngster as it first begins to get about. We find large individual differences. Children, we know, may crawl by hitching, by rolling, by creeping on hands and knees, by "loping" on hands and feet, by falling forward, by scooting or by backing. Some children never crawl. It would appear that all we need assume, in order to understand such simple cases of locomotion, is a general state of organic restlessness, induced under metabolic instability of the nervous system and under the urge to get from *here to there,* and the ability to do so. The child then uses all his available resources by way of locomotion. The child appears to *chance* upon a way of satisfying its desire to attain some goal; that is, it discovers a way to reach its objective. And it retains this mode of locomotion until more adequate means, for example, walking, appear. This is very clearly shown again and again in the behavior of children just starting to walk. When they are urged to hurry, they may start walking. But apparently walking does not get them fast enough to where they want to go; so they make use of a faster method. They drop to the floor and begin to crawl, or scramble, toward the goal. It is, in general, only when the legs of the child grow strong enough to support it and to carry it at a faster gait than that of crawling that we find walking clearly taking the place of crawling.

The change in gait of an organism under the constant urge of the goal is very strikingly shown in the behavior of hungry chickens. If one calls to a flock of chickens, at a distance, one sees that many start walking, then after a bit they break into a run, and finally they begin to fly. The stimulus conditions remain unchanged but three distinctly different types of behavior involving the organism in different ways appear. Walking, then, appears to be a way of attaining some goal. Blanton and Blanton point out that certain things are quite necessary before walking appears in the child. These are "(1) Good bones, muscles and nerves; (2) a certain amount of intelligence, and (3) something to walk for." Of the three, the last is held as being the most important. Walking waits upon the ripening of bodily structures and upon learning. According to Kirkpatrick, learning is more important than maturation, particularly of some inner impulse. He tells us that "the fact that children are a long while learning to walk, and that various movements such as rolling, crawling on stomach, or on hands and feet, hitching along in some form of sitting position, pushing one's self backward or rapid running from one support to another, may be used as a

means of approaching objects, before the child attempts ordinary walking, seems to indicate that there is in human beings no instinctive mechanism for walking. . . ." (*26*, 115).

The period at which children begin to walk varies considerably with different individuals; and, according to some, may be taken as a rough measure of the child's intellectual equipment. The following table from Hollingworth gives a comparative statement of the ages of walking and talking of gifted, normal and subnormal children. The gifted walk almost a year earlier than the subnormal children—an enormous difference.

TABLE IV

AGE AT WHICH WALKING AND TALKING APPEAR

INTELLIGENCE LEVEL	AVERAGE AGE AND MEASURES OF VARIABILITY	
	Walking	Talking
Gifted (600 cases)	12.8 months S. D. 2.5 mo.	11.2 months S. D. 2.8 mo.
Normal, or somewhat higher (50) cases	13.9 months A. D. 1.6 mo.	15.3 months A. D. 3.0 mo.
Feeble-minded (144 cases)	25.1 months A. D. 9.6 mo.	38.5 months A. D. 16.8 mo.

DEVELOPMENT OF THE PSYCHOLOGICAL FUNCTIONS

The infant is unable to function psychologically to any considerable degree. We do not find any acceptable evidence of the presence of such activities as thinking, imagination, memory, and recognition. The capabilities of the infant are much like those of the animal, except that the latter appears in some respects to be distinctly superior. In each we find use made of perception and action. The individual in the beginning reacts in a few unlike ways to stimulus objects. We assume that it perceives differently. In these two ways of functioning we have, perhaps, the closest psychological link between the human infant and the animal. Both are primarily perceptual-motor creatures. They see, hear, feel; and they act. But with increased age the human being grows rapidly away from the animal. For development soon brings new functional possibilities to the child which place it, in many respects, above the highest members of the subhuman order.

The neural basis of the psychological functions is quite inadequate at birth to provide to any appreciable extent for the diversity and the

range of activities so characteristic of the average human adult. As we have pointed out, the child at birth appears to possess certain capacities for movement, but aside from those simple utilitarian devices which enable it to take food, close its eyes to a bright light, move its head from side to side to free its mouth, and squirm, the child is fairly helpless. The central nervous system which serves as a basis of psychological behavior is unprepared to operate in specific ways. That part of the nervous mechanism often called the old brain, which underlies and regulates the bodily functions, works quite efficiently. The child breathes, digests, excretes, and grows. The part of the central nervous system which is known as the new brain, or the cerebrum, and which plays such a predominate rôle in human behavior, is not ready, however, for full operation; nor will it be until after several years. And without it, certain of the psychological functions, *e.g.*, imagination, thinking, understanding, which serve especially to give the distinctively human touch to the organism, cannot come to full expression.

The Significance of the Cerebrum. The psychological functions of the child are largely dependent for their normal development upon the proper maturation of the association areas and the frontal lobes of the cerebrum. Ladd and Woodworth (*29*, 62) remark that it is the cerebrum which shows most development after infancy because "it is probably this part of the nervous system which is chiefly concerned with learning, education and all individual acquisitions. More definitely, the development to be expected would occur in the cortex and the axons connecting its various parts." In the human infant the millions of minute nerve fibres of the new brain are not sufficiently matured to make possible precise modes of activity. We say, however, that they possess enormous potentialities because of the possibilities which they offer for innumerable connections.[1] In the richness (number and diversity) of the possible neural patterns offered in the cerebrum we discover one of the major keys to an understanding of the superiority of the human individual over the animal. Even the highest mammals do not approach the human being in the possible number and complexity of neural association. The huge apes, for instance, appear to possess a cortical mass only approximately one-half as great as that of a human organism of

[1] Concerning cortical connections Herrick tells us that, "During a few minutes of intense cortical activity the number of interneuronic connections actually made (counting also those that are activated more than once in different associational patterns) may well be as great as the total number of atoms in the solar system. Certainly not all anatomically present connections of nervous elements are ever used, but the *potentialities* of diversity of cortical associational combinations are practically unlimited and the personal experience of the individual is probably an important factor in determining which of these possibilities will be actually realized" (*20*, 9).

equal bodily weight. The child then unquestionably has the basic neural materials for large functional attainments; but it requires some time after birth for them to develop into shape for effective operation. It is generally claimed that an individual's brain grows rapidly in weight during the first three years and then more slowly until around adolescence; at which time growth mainly ceases. The following table gives some data on this problem of human brain weight at various ages. It is adapted from Ladd and Woodworth.

At birth	Average brain weight	380 grams
At one year	" " "	945 grams
At two years	" " "	1025 grams
At three years	" " "	1100 grams
At four years	" " "	1300 grams
At fifteen years	" " "	1400 grams

Behavior with Cerebrum Lacking. The part played by the cerebrum and the cortex in the individual's life is clearly shown in those creatures, animal and human, which are lacking in such structures. Koffka compares the behavior of a dog and of a child, in each of which the new brain or cerebrum was missing. It had been operatively removed from the former and was innately lacking in the latter. Each lived in a cerebrum-less state for approximately three years.

The dog soon learned to run and even jump a hurdle, whereas the child lay contracted and almost motionless for three years and nine months, never making any attempt to sit upright. Neither did he attempt to grasp or hold anything in his hands. Only in his face could a certain mobility be noted, when occasionally the features were painfully distorted. Both the lips and the tongue were used together in sucking and in taking nourishment from a spoon. The dog, which at the beginning had to be fed like a child, later learned to feed himself so well that it was only necessary to put the dish before his nose and he would empty it. Of the great restlessness which dominated the dog after the restraint exercised by the cortex had been removed by the operation, making him constantly run about, nothing was ever apparent in the child. Only a continual crying was observed from the second year onward, and this could be stilled by patting him, particularly on the head. . . . The acts of bodily excretion, which took place in a normal manner in the dog, were accomplished by the child without change of position; nor did he in any way indicate when his napkin was wet. With the dog, sleep alternated with waking, whereas the child seemed always to be sleeping. The dog could not taste, smell, or hear, nor could any evidence of vision be found. This was likewise the case with the child; yet both responded with optical reflexes, and at times the eyes would close in a cramp-like manner under stimulation from light. It was not possible to find a single mental reaction in the child, or in

any way to get in touch with him, so as to teach him anything; but to a certain degree the dog could be taught, and he also gave evidence of moods, fits of temper, and periods of contented quiescence (*27*, 58).

The Child Discriminates from the Very First. Judging from its behavior we assume that the child discriminates from the very first moment of postnatal life. There is no cause, however, to assume any perception, at the very beginning, of objects by way of well-defined shape, size, or position. We infer, rather, that the child has certain sensory patterns, in which *gross* differences occur. The tactual receptor organs for pressure and temperature are apparently functionable at birth. The child, upon being touched either upon the palm of the hand or the sole of the foot responds in a characteristic manner. The stimulation of the lips results in certain movements which may be called sucking. If the milk or the bath is too cold or too warm, the child becomes restless. If the food materials are very salty, sour, or bitter, they are repulsed. The child, however, accepts sweet materials. Moreover, it presumably discriminates quite easily between the breast odor and other olfactory stimuli; and within a few weeks it apparently comes to the full use of its auditory abilities.

In all of these cases of infant activity we may properly assume a certain degree of unity and pattern. Concerning this feature of the perceptual activities, Koffka writes:

> The first phenomena are *qualities*, or *figures*, *upon a ground*. Introducing at this point a new concept, we add that they are the simplest of mental *configurations*. The phenomenal appearance in consciousness divides itself into a given quality, and a ground upon which the quality appears—a level from which it emerges. It is, however, a part of the nature of a quality that it should lie upon a ground, or, as we may also say, that it should rise above a level. Such a co-existence of phenomena, in which each member possesses its peculiarity only by virtue of, and in connection with, all the others, we shall henceforth call a *configuration* (Gestalt). According to this view, the most primitive phenomena are configurative. As examples, we shall take the luminous point set off from a uniform background; something cold at a place upon the skin set off from the usual temperature of the rest of the skin; the too cold or too warm milk in contrast with the temperature of the mouth-cavity. We attribute configurations, also, to such reactions as the rejection of milk when it is not of the right temperature; thus milk in the mouth may lead either to an "adequate" or to an "inadequate" configuration (*27*, 145).

The Child Begins with Very Simple Patterns. The early beginnings of the psychological functions, then, are not wholly chaotic in character as some would have us believe. At no time do we find utter confusion in

neural activity. Neither do we discover a sound reason for assuming that the perceived world of the child is in the beginning a "great, blooming, buzzing confusion." The proper recognition of this assumption is valuable in that it enables us to understand better the nature of the subsequent development of abilities. Where some degree of functional organization and integration, even though quite simple, exists from the very start, development is largely quantitative in character. It becomes a matter of extending the boundaries of such simple patterns to include larger and more diverse situations in order to give us the typical patterns of the adult. There is, then, no break from the simplest perceptual patterns of the first day of the child to the very highest forms of the adult. However, if we start with utter confusion in the beginning, we must postulate the existence of some agency by means of which order and coherence is later introduced into the individual activities. In addition we must accept a complete lack of neural unity. Judging in terms of behavior, we have reason to believe, however, that there are simple neural *patterns* even prior to birth.

The functional activities (perception, memory, imagination) develop very gradually. In a great many, if not all, cases it is clearly impossible to determine the simplest beginnings of these complex psychological operations.[1] If mental tests are taken or observations are made at fairly long intervals of time, it can probably be said that at one time a particular ability was lacking and at another time it was unquestionably present. Just as we are unable to name the exact day at which a seed starts to germinate or to grow into a plant, so we are unable to mark sharply the onset of any of the psychological abilities in the human organism. In perception, for instance, it appears most likely that the child comes by very imperceptible degrees into possession of a knowledge of the various aspects of objects, things, and events.

[1] Discussing this point, Major writes, "One snare which marks the way of the student of infant ways is the desire to fix with exactness the dates of the first appearance of given abilities or functions. The search for beginnings, the absolutely first appearance of definite processes like turning the head when looking for the source of a sound, reaching for objects and grasping, anger, fear, imaging, recognizing and the like will always end in failure for the reason that there are no complete breaks in the chain of experience which warrant one in saying, 'at that moment the child could *not* do so and so, at the next he could.' . . . Indeed, the one thing which, for the writer, stands out more prominently than any other, as a result of the observations recorded in these *Studies*, is the fact that the child acquires his various abilities by slow, almost imperceptible steps. He is possessed of a vast number of native instincts or impulses, and these make their appearance by infinitesimal steps or degrees. For example, the instincts to reach and grasp, to imitate, to walk, to talk—all come to perfection gradually. To be sure, the process is more rapid in some lines than in others; but in the most rapid there are no absolute breaks which warrant one in saying, 'at this moment a child lacks a certain ability, the next he has it.' " (*31*, 7).

The Functions Are Cumulative. Such functional abilities are generally recognized as being cumulative in character. "Function reacts upon itself," Bentley says, "profoundly modifying its subsequent exercise. Were this cumulative effect absent, experience would be like the successive and separate display of characters upon the paper as the typewriter is shifted. There each character takes its place upon the line without modifying or influencing its neighbors. But in the functions of the organism the earlier terms affect the later, changing their nature and modifying their significance" (*5*, 500). The individual performs differently on subsequent occasions because of the nature of its previous activity. The organism apparently stands affected through internal growth and through its own exercise under the many and varying environmental situations. A muscle grows, we say, because of extrinsic conditions; but it also develops because of exercise. The same is true of the psychological abilities. Concerning this point, Herrick writes, "Presumably the stable patterns of cortical association are changed by the performance of these acts (thinking, deciding, feeling, and the like) just as on a lower plane muscles are changed by systematic exercise" (*20*, 18). The organism grows; and this growth means an enlargement and a refinement of the simpler psychological activities. The individual comes to perceive the world with more and more knowledge; or it is able to respond to the same situation according to increasingly unlike modes of behavior. It has, we say, enlarged its repertory of movements. But functional growth, we must point out, is more than mere enlargement. The individual slowly acquires greater precision. It becomes more proficient and more skillful in the performance of its activities. It perceives, for instance, more finely or more sharply; and it executes its movements in a more accurate manner. In short, the individual grows in control.

Behavior Changes Imply Brain Changes. Now this increase in control is very significant. It is not so much a matter of outstanding changes in receptor organs or in the muscular and glandular tissues; it means, rather, that the neurological basis of behavior is becoming increasingly effective. The cerebral pathways are slowly and gradually being moulded into more precise patterns which govern activity. The individual is being more and more sustained in its activities by the higher neural centers. This cortical control of behavior is especially important because it permits of the incorporation of many new items among the old to produce new patterns of behavior. The individual facing a situation slightly different from all those previously faced, is able to marshall the results of its past in a more effective manner to meet the new by virtue

of the operation of the central nervous system. And because the past may be ordered coherently the new is able to find a place. If each time the child, or animal, faced a situation, the resultant behavior were purely of a chance character released through the play of environmental forces upon a neutral organism, there would be no stable foundation upon which to build. It would be comparable to the repeated behavior of bits of iron in "arranging themselves" with respect to the "lines of force" in an electric field. Here, the arrangement depends each time not upon any property which the filings bring because of their past behavior under such conditions, but upon the chance play of the electric forces. But, as we actually discover, the central nervous system and more particularly the cerebrum, provides day after day the common basis upon which subsequent behavior patterns are slowly built.

The human organism develops, then, by adding new skills, new attitudes, new fears, new likes and dislikes, new ambitions, and so on. The child changes its way of thinking, feeling, and acting slowly and gradually. It ceases finally to be childlike. The neural patterns underlying behavior are modified during the course of its development by increasing their scope, so that they may finally sustain the individual in the performance of tasks which call for the exercise of profound thinking, resolute determination and skillful execution of elaborate actions. Sustained *action* at high levels is strikingly shown, for example, in the operation of intricate machinery or in some games of manual skill.

During the course of development we may, however, lose our simple fears, our baby-talk, our infantile modes of feeding, our childish desires, our school-day loves, our youthful scrawling and our adolescent awkwardness. It may well be that in some cases, at least, these earlier components of behavior are never lost, but merely put aside or inhibited. We know how extremely readily "baby-talk" may arise in adult years under certain situations. Or under haste, old ways of acting, or of speaking break out. Under certain "abnormal" conditions of the organism, behavior of a sort closely approximating the infantile type may appear in an individual of mature years. Undue thwarting, for instance, may release "tantrums," or attitudes, characteristic of much earlier life periods. We recognize that the growing individual increasingly acquires inhibitory abilities. This is perhaps one of the more striking and characteristic ways in which development occurs. The person who, as a young child, kicked, squirmed, screamed, struggled when being given his bath or when being dressed, now smiles good-naturedly when the scrubbing is unusually vigorous or the dressing unusually tedious. Such wholesale changes occur in every person. The student can find many

ways in his own life where control has been increasingly developed with the years. The old has been put off, and the new has been added.

We wish to make clear that one of the most important phases of psychological development in the human is this modification in function by way of the introduction of new, and the partial, or total, elimination or inhibition of old behavior components. Aside from the actual appearance of new abilities such as memory, imagination, or reasoning—just as new "instincts" are said by some to appear with time—the most characteristic form of psychological growth is by way of a progressive extension and enrichment of the functional traits. The individual uses the same activity on an increasing number of occasions, or situations. Each of these presumably contributes its share toward the way in which the person reacts toward the world about it. It means that the child brings to life situations the results of its past. Because it has performed in a given way in the past, it tends to *behave in a similar manner* in the present situation. It is, we say, tuned or set for a certain mode of behavior.

THE IMPORTANCE OF SET IN PSYCHOLOGICAL BEHAVIOR

We could write a long descriptive account of psychological development of the individual's abilities in terms of set. Wherever we turn in psychology we come upon the contributions of tuning, setting, or predisposition. Such tuning may be either physiological or psychological. Theoretically, it may be either racial or acquired. If an individual has been accustomed to taking food, being bathed, put to bed, awakened at a certain time, the approach of that time is heralded by a clear inclination to behave in the old manner. A child accustomed to eating regularly at intervals of four hours, grows hungry at those times. Perhaps, we should say that it becomes restless and acts in a certain way toward food. If fed, it again becomes quiet. If not fed, the food desire may temporarily pass away. If the child has been awakened at certain times, it tends without external stimulation to awaken at the same time. The control of behavior in such cases has been shifted to intrinsic factors.

The development of the child is characterized by the creation of a large number of sets for fairly definite activities under fairly definite conditions, either external or internal. The developing individual may be so tuned that it will behave in almost any manner. It may be set to be generally polite; or polite only under specific conditions. It may be so strongly disposed that it behaves in a way sometimes described as second nature. Thus a total situation comes finally to release somewhat automatically certain patterns of activity. Just as a rat or dog

placed in its feeding box will behave differently than when placed in its sleeping den, so can the child be set to be neat in dress or work, accurate in observation or statement, and straightforward in his contacts with his fellows. A great deal of psychological development of the individual consists in the establishment of situational predispositions, under which activities may be initiated. The person becomes so disposed that the presentation of a particular stimulus arrangement serves to release desired patterns.

Three Forms of Instruction. The individual may be set permanently or momentarily through instruction by other human beings. We say to the individual, when we wish to prepare him for acting, "I shall show you some numbers which you are to add and then multiply"; or, "Take the following message"; again, "You must stand when she speaks to you"; finally, "You must not do those things." Such instructions as these prepare the organism for the initiation of particular activities. It is better able to meet the demands laid upon it. Moreover, it is a way of securing social conformity. We tell the newly created brother to "hold his hand in a certain way," "to speak softly," or "to proceed to the throne in a certain manner." Here is represented a very widely employed and extremely valuable method of tuning. Finally, with the development of speech and understanding, the individual is brought to a place where he exhibits a form of preparation best described as self-tuning or instruction. This is one of the few ways of achieving self-sufficiency in control of behavior. The individual can say, for instance, "I must not do this," "I will not give up," "If that happens, I will act in that way," and so on. The mere saying of "NO" to a high-pressure salesman may give one courage to refuse. The repeating of an oath may sustain one in the time of need. This sort of preparation may serve the high purposes of carrying the individual through tremendous emotional crises or the lowly ends of guiding many of the everyday actions. Dashiell gives the following illustration of this sort of control: "The chauffeur repeats to himself . . . 'where the car track turns, keep straight on one block, then turn left two' . . . and at the appropriate moments he suits the actions to the words" (*13*, 480).

The facts, we believe, are clear. An individual behaves differently because of his past, either remote or immediate. It may well be true that he knows nothing about his past in this particular connection. The situation merely calls for a certain type of behavior. To those who hold to racial tuning, behavior in such situations may be called instinctive. It may, however, be a form of physiological tuning through habituation. We come to desire our meals at a given time, our smoke

after the meal, our afternoon nap, and our tea. Tuning of this sort may be strikingly shown in case of post-hypnotic behavior. Here the individual, set a few minutes before for a certain type of activity, finds the perceived situation calling for the execution of some activity, although he may be quite unable to state any "reason" for such conduct. There is sufficient evidence for believing that a great deal of a child's common behavior is released much after the manner of the post-hypnotic subject. The child does certain things at certain times; *it has not much notion as to why it does them.* But, as we said, the individual may be knowingly tuned through memory. He faces a situation and recalls that he must act in a certain manner. He may be guided by the instructions of his parent, his teacher, or his comrade. Or he may verbally prepare himself for some performance. These three ways constitute forms of psychological tuning.

PERCEPTION AND ACTION

Of the various functions, the two which appear first in the child are *perception* and *action.* Out of the many impulsive actions, the organism appears to select and to link up certain forms with its perceptions. The perception of the object then tends to call forth particular actions. "An extremely important moment in psychological development," Bentley tells us, "is derived from the intimate fusion of perception and action. This fusion is strikingly presented in puzzling situations in which the child or other animal seeks a deferred and difficult outcome. The dog or cat in the puzzle box or the child seeking to 'find' an object before eye and hand are coördinated gives us the setting for this functional fusion." Or consider the *hand-to-mouth* behavior of the young child as illustrative of the intimate relation between perception and action.

"Hand-to-Mouth" Patterns. We find clear evidence, very early in the life of the child, that all roads lead to the mouth. Getting objects into its mouth seems to represent an outstanding goal; for every object touched is carried, if possible, to the mouth. But the inexpertness of such behavior is just as striking as the fact that it does succeed in getting objects (its fingers, toes, clothing, and its toys) into its mouth. In such behavior of the child, we find a pattern which appears to involve the whole organism; moreover, it gradually increases in efficiency with increased age. When the hand of an infant comes in contact with some object, it closes and starts toward the head. The head in turn coöperates. It is raised, lowered or turned partly, in order to permit the hand to reach the mouth more easily. If the object strikes the cheek, forehead,

or chin, the head is appropriately turned instead of the hand merely being moved about until the object comes upon the mouth. The head is apparently as much concerned in the operation as is the hand.

The child does not seem to learn to carry its hands to its mouth from every possible position. That is to say, there is no good reason for assuming that the child actually learns to execute this movement properly from the many thousands of possible positions around about its head. Whether the hand is started above the head, below the head, to the right or to the left of the head, and so on, it moves on to the goal. It means that with time the individual secures control over the movements of its hands. Thus it is able to move them more effectively.

An interesting fact about this form of behavior is that it seems to be strictly a *hand-to-mouth* movement. If a stick of candy, for instance, is placed in the child's hand, it does not cease its thrust until its *hand* actually comes into contact with its *mouth*, even though, in so doing, the candy is pushed far back into the mouth or into the throat. The essential nature of this behavior of getting perceived things to the mouth may be made clear by considering those adult patterns in which some object is perceived as something to react to in a definite way. Thus an officer is perceived by a soldier as an *object-to-be-saluted*, a snake is instantly perceived by the timid as a *creature-to-be-avoided*, or a sweetheart is seen as a *person-to-be-caressed*, and so on. Many of the other perceptual-motor patterns of the child of a nature quite similar to the *hand-to-mouth* sort are established fairly slowly. Others are set up quite rapidly. We find, for example, that it required two months to bring a two-year-old child to a condition in which a door knob became a *thing-to-be-turned* (Major). On the other hand we know that a toy may very quickly take on the *reach-for-and-handle* nature.

The Perception of Form. The perception of form appears to come slowly in the child. The test of the ability of the child to copy a square belongs, as we know, in the *fourth* year of the Stanford Revision of the Binet test. The child, of course, perceives visual form even before

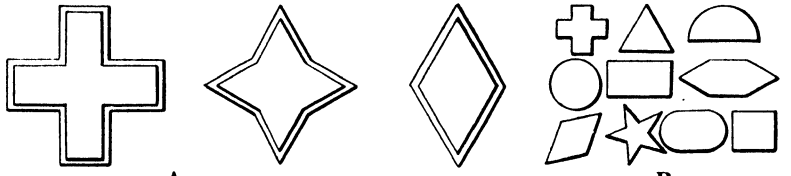


FIG. 28. A. Diagrams of simple tests for determining some early perceptual-motor patterns. B. Form board.

this time. Of the various tests, the Goddard form board provides perhaps the best method of determining the individual's ability to discriminate forms. This test demands that the child be able to place squares into square holes, triangles into triangular holes and so on. (See Figure 28.) The test furnishes a quantitative measure of such ability inasmuch as the child does or does not put the object into the correct hole. According to Baldwin and Stecher, the successful child of two years of age requires an average of 257 seconds to complete such a test; the child of three years of age takes about 76 seconds; the four-year-old needs around 38 seconds; the individual of five years of age spends about 30 seconds at the task and the six-year-old child gets through in an average time of 26 seconds. Arlitt finds that many four-year-olds will attempt to "pound star-shaped blocks into spaces cut to fit triangles."

Tests of Motor Control. These form-tests obviously require motor ability. There are some tests which are used especially to measure the development of motor control. Among these are the measures of aiming and tapping, punching marked holes in paper, walking upon a narrow board and tracing simple patterns drawn on paper. The child at various ages differs considerably in its ability to perform such tasks. Take the task of tracing the three diagrams shown in Figure 28. We find that "for the two-year-olds the diamond is the only figure that yields a positive score. All three figures reveal a good score at three years, and a rapid increase between three and four years with a more gradual increase between four and five years. At five and at six years the average performance is almost perfect" (*4*, 91).

The Perception of Distance. The ability to perceive distance, too, appears to start very simply in the individual. It is probably not until the child begins to walk that it comes to more accurate perceptions of the nearness or the remoteness of objects. Some knowledge of distance may develop through the employment of the arms in reaching. We know, for example, that the blind gain knowledge of distance in this manner. The young child, lacking facile use of its arms and being unable to walk, is at first denied these two fundamental ways of building up perceptual distance. Arlitt, in discussing this phase of the child's life, writes, "He will reach as readily for bright objects at a distance once he has fixated them, as he will for objects which are near at hand." With exercise the child gradually acquires many cues, non-visual and visual, in terms of which, distance becomes visually perceived. It presumably comes to use the convergence of its two eyes in judgments of distance. Later it learns to make use of such cues as superposition,

shadows, size, clearness of outline, and coloring. The dependence placed upon certain of these visual cues in the perception of distance is strikingly shown in the inaccurate judgments of the individual transported from a part of the country in which the atmosphere is hazy to another part where the atmosphere is quite clear.

MEMORY AND IMAGINATION

When we leave the perceptual and pass to the memorial and the imaginational activities of the individual, we simultaneously increase the difficulty of our descriptive task. There is evidence of learning in the very start, but there is not valid reason for assuming that the infant of a few weeks of age has any connection with its past by way of recollection. Moreover, no evidence of any use of recognition occurs during the first few weeks. Very soon, however, the child begins to widen its perceptual activities in this way. Its behavior toward its mother or nurse becomes different from that shown in the presence of strangers. Furthermore, within a half year an infant, upon being taken into a room different from that in which it has previously been kept, gives evidence of its recognition of the fact. "Its behavior alters; the infant looks around the room with wide-eyed astonishment, which disappears as soon as he is returned to his usual surroundings" (Koffka). Here we say, is perceptual recognition.

According to the data cited by Hunter concerning the ability of children to go to a previously lighted place in order to secure food, we know that a child of one and one-fourth years of age was able to wait 20 seconds; a child of two and one-half years was successful after 50 seconds and a five-year-old was able to wait as long as 20 minutes without being disturbed in its ability to secure the reward. If one should classify these activities as memory, then the child of two and one-half years of age apparently has very little memory. Not for quite a while, perhaps three or four years or even longer, do we have clear evidence of the extension of the time reference (not mere recognition) to include the recollection or memory of events of the child's yesterday.

Memories of Very Early Events. It is a striking fact that, of the thousands of situations faced and lived through by the individual during his early years, only a few, if any, are recallable. Seldom indeed, does one have memories of events which occurred before the ages of five or six years. Concerning this point, we learn from Koffka that, "Even for a four-year-old child a definite remembrance of yesterday is difficult, and one of the day before yesterday impossible. At this age there exists a vague impression of happenings long past, likewise a rough distinction

between before and after, and occasionally one between today and not today" (*27*, 258). According to Darwin, his first recollections date from the age of four years and several months; and Rousseau says much the same, "I do not know anything about what I did before the age of five or six. I do not know how I learned to read" (*12*, 211). Very frequently the definite references to a particular event which one may have and which one considers as recollections are actually to be attributed to the fact that the individual has been told at a later time that he behaved in a certain manner on some earlier occasion. He then proceeds to forget having been so told and believes that he is actually recalling the event.

The fact that individuals are unable to recall the happenings of the early years of their lives is cited by some as evidence of the lack of *true* memory during those days. Major believes that the inability to recall the happenings of one's childhood days are to be attributed to the following conditions: (1) the weakness of association and the lack of continuity of mind; (2) to the lack of accurate localization of experience in time and place; (3) to the lack of imagery and (4) to the lack of voluntary recall. For some, the failure of the adult to reproduce infantile experiences is to be explained in terms of a lack of well-established language during those earlier years. Because the individual could not verbalize then, it is now unable to verbalize. Furthermore, the evidence from some psychoanalytical sources concerning the problem of infantile memories is interesting. It is claimed that under proper encouragement an individual's ability to revive earlier happenings and incidents is much greater than we are commonly led to believe. Under hypnosis and skillful probing an individual may revive the memory of some event quite unrecallable under usual conditions. Memories of outstanding events of the first few years may thus be elicited. Furthermore, under such conditions the individual may behave in an infantile manner. He may lisp or break forth into baby talk.

Whether the child has clean-cut memories of events occurring during the very early years is a difficult problem to settle. There is, without doubt, a great deal of truth in the claim of some students that the effects of certain events of the early years remain long to afflict the individual. During the first four or five years the foundations of a great deal of adolescent and adult behavior are apparently laid. Hollingworth expresses very clearly the nature of this contribution.

> The fact that habits of action and habits of attitude and emotional reaction may be established in infancy and may persist in later life, with no recall of the circumstances of their formation, is a very significant one for

development. For one thing it means that inexplicable feelings of repugnance, dread, shame, satisfaction, originally set up in connection with events, situations, or persons in those days, may now be touched off by the details of present experience, with no adequate grounds for their occurrence except this history. In recent years certain forms of neurotic involvement have been attributed to such early bias. From this point of view the first three years of childhood assume an important rôle in the general development of character, temperament, and attitude.

From the point of view of training, it is also useful to realize the great possibilities of this period. For habits of action, of emotional adjustment, of obedience, of cleanliness, of consideration, and the like, may here be established with whatever accompaniment of penalty may be required. The habits will tend to persist, without that memory of the circumstances of constraint and without the feeling of resentment that often survives from the effort to compel such habit formation in the later years. Habits set up in these early years are more likely to appear later in the guise of personal tastes and constitutional preferences, since the personal circumstances attending their formation are not recalled (*52*, 144).

According to White:

The period of infancy with all its budding possibilities, all its beginnings, trials and failures, its blazing of trails and its fundamental formulations (time and space) is the most important period of life. This is the period when all the tendencies which are to be the motive forces in the future history of the individual acquire their initial direction; it is the time when the foundations for the future are laid.

Anticipatory Behavior. If the child's perceptions slowly extend backward to include something done yesterday, the day before yesterday thus giving us our true memorial activities, they just as truly gradually reach out of the present moment to include that which is about to happen. We spoke earlier of the simple beginnings of imagination in the animal. Here we point out that the child appears to extend its perceptions into the future by way of an anticipation. If the bottle is brought toward the hungry child, it becomes active. It jumps and kicks and mouths. Or the baby which repeatedly hears footsteps and is then swung high in the air by its father shows clear evidence of anticipation when the steps sound outside the door. Thus we see that the perceptual situation serves to release behavior that can best be described as anticipatory. The external situation, at first, is mainly effective in releasing this forward-tending behavior. Slowly the child comes to guide its behavior more and more in terms of intra-organic conditions. It gradually reaches a place in which behavior may be released, although

there is nothing in the *extra-organic* situation to account for it. The individual then reacts, we say, to an internally created environment.

Phantasy and Self-sufficiency. Psychological development partly consists in the individual's becoming more self-sufficient in this respect. This increase in self-sufficiency appears to wait peculiarly upon the growth of language ability and the appearance of imagery. With this equipment the individual tends to create quite early a world of phantasy and make-believe in which it appears to spend a great deal of its waking life. The range and variety of such waking phantasies are determined mainly by the behavior of the family members and the actual limits of the child's imagination. The individual during these earlier years seems indeed to live in a dream world produced out of its own imaginational resources. The same back yard is changed day after day into many novel situations; and under each the child appears to behave according to the dictates of its imagination. A stick may become a bucking broncho; a box, a mighty engine; and a chair, a pitching ship in a storm. From a rag and a bone the child may create a living creature which may be in turn its mother, the nurse, or the cook. But the child does not necessarily require a material object upon which to hang its imagination, for it may surround itself, as we well know, with wholly imaginary companions and objects. The story is told of a young child that burst into tears upon seeing its mother sit down upon a chair. She had sat down upon the companion of her child's dream world.

The Uses of Imagination. There are some persons who find in the fertile imaginational play of the child the infantile foundations of the later inventor, poet, or scientist. Such persons advise the employment of every possible means of developing this form of the psychological functions. In later years, they maintain, it can be turned by the individual into productive channels or used as a valuable means of securing rest and relaxation from the responsibilities of a too-practical world. They insist that any undue suppression or thwarting of the imagination in the child will tend to result in a permanent blighting of this ability in the adult. It is true that we learn, on every hand, that creative production—artistic, literary, and scientific—literally feeds upon the imagination. Moreover, the adult knows from his own life that the imagination may offer a way of escape from the dreary monotony of an oppressively dull existence; and so make life livable. Finally, we must not overlook the fact that the imagination properly developed may serve as a powerful source of motivation. It becomes, so we know, a means of stimulating the individual to greater achievements.

There are others, however, who see possible danger in the unbridled

imagination of the child. They maintain, for instance, that it offers the individual such an easy way out of life's difficulties that the child, and later the adult, may be kept from playing his proper part in the world of reality. The individual may actually become too self-sufficient to make a success in the world. It is claimed that the individual who is unable to leave behind him this magic tool of his childhood days is most likely to be unfitted to face the stark reality of life's situations. Such persons would find, for example, in the clinging by an individual to some imaginary, ideal sweetheart the real barrier to true happiness in actual marriage. The individual is unable to leave the world in which all men are chivalrous or all women are beautiful, and face life as it really exists. On the whole, perhaps, it is true that in some cases, at least, an undue entertainment of the imaginary (ideal) may incapacitate the individual in his contacts with reality.

Childhood Lies. The child very frequently confuses the objects and events of its perceptual life with those of its memorial and imaginational life. That is, it tends strongly to confuse fact with fancy. Possessed of a budding imagination, and unhampered by inhibitions and critical knowledge, the child tends to spin wild tales of itself and its companions. Frequently it mistakes that which has been dreamed for that which has been perceived. It seems actually impossible at times for the imaginative child to distinguish between the real and the make-believe. The child has to discover for itself that it has an imagination. Until it does, the imaginary objects of its life are presumably quite real to it. Because of imagination the child apparently has great difficulty in arriving at a satisfactory solution concerning the nature of truth and falsehood. At times it seems that the child is deliberately lying. Upon close examination it may be found, however, that the child is actually doing its very best to interpret its phenomenal world where events dreamed move hand in hand with events perceived. The little child is not alone in this weakness. For in this type of confusion we are reminded of similar mistakes in the adult. Not infrequently we discover that some friend has to consider long and seriously about some previous event before he is able to state that it was something imagined (dreamed) or something perceived. Even then he may be wrong. Quite recently an adult recited a long "dream" about certain events, but later it was discovered that the individual had actually read the account, forgotten the reading, and repeated the story as having been dreamed.

Of this phase of the child's life Stevenson writes that whatever we are to expect at the hands of children it "should not be any peddling exactitude about matters of fact. They walk in a vain show and among

mists and rainbows; they are passionate after dreams and unconcerned about realities; speech is a difficult art and not wholly learned; and there is nothing in their tastes or purposes to teach them what we mean by abstract truthfulness." The child spins wild tales but all such tales are not the unconscious confusion of fact with fancy. The child, as we should expect, comes after a time to use most, if not all, of the resources of the adult, in order to secure its ends. The way to truthfulness which a child has to learn is indeed difficult to master. According to Hollingworth, "the petty lies and confabulations of childhood, the ready confusion of fact and fancy, the easy dramatization and personification, are in the typical case free from malice and iniquity. They reveal how long and hard a road we have to travel before we may hope, in maturity, to have clear distinctions between the true and the false, the actual and the imagined" (p. 173).

EMOTION

Since we found acceptable evidence of emotional life in animals, we should rightfully expect to find like activities in the young child. In fact, there is sufficient evidence to lead us to believe that not only do we find emotions at birth, but that emotional training or conditioning may begin immediately following birth. Gesell writes as follows concerning the rapid changes in the behavior of the infant:

> How precociously and efficiently he (child) exhibits his powers of learning, is illustrated by a certain infant who recently came to our attention. In the first day of life this infant cried at every new, pronounced stimulus—as soon as he was picked up he cried;—he ceased to cry when allowed to lie quiet. In two weeks the social environment induced a complete reversal of this relation between stimulus and response. He cried when he was in the crib; he ceased to cry when picked up (*17*, 201).

Fear. Watson was one of the first to apply the methods of strict experimentation to the study of the emotional life of the child. He found three types of behavior patterns which he described as fear, rage, and love. For fear, the eliciting situations are as follows:

> (1) To suddenly remove from the infant all means of support, as when one drops it from the hands to be caught by an assistant (in the experiment the child is held over a bed upon which has been placed a soft feather pillow); (2) by loud sounds; (3) occasionally when an infant is just falling asleep or is just ready to waken, a sudden push or a light shake is an adequate stimulus; (4) when an infant is just falling asleep, occasionally the sudden pulling of the blanket upon which it is lying will produce the fear responses (*42*, 199).

Rage. For rage, Watson writes:

Observation seems to show that the *hampering of the infant's movements* is the factor which apart from all training brings out the movements characterized as rage. If the face or head is held, crying results, quickly followed by screaming. The body stiffens and fairly well-coördinated slashing or striking movements of the hands and arms result; the feet and legs are drawn up and down; the breath is held until the child's face is flushed. In older children the slashing movements of the arms and legs are better coördinated, and appear as kicking, slapping, pushing, etc. These reactions continue until the irritating situation is relieved, and sometimes do not cease then. Almost any child from birth can be thrown into a rage if its arms are held tightly to its sides; sometimes even if the elbow joint is clasped tightly between the fingers, the response appears; at times just the placing of the head between cotton pads will produce it (*42*, 200).

Love. The situation which produces the love responses

seems to be the stroking or manipulation of some erogenous zone, tickling, shaking, gentle rocking, patting, and turning upon the stomach across the attendant's knee. The response varies. If the infant is crying, crying ceases, a smile may appear, attempts at gurgling, cooing, and finally, in slightly older children, the extension of the arms, which we should class as the forerunner of the embrace of adults. The smile and the laugh which Freud connects with release of repression we should thus class as original reaction tendencies intimately connected from infancy with the stimulation of, in our opinion at least, the erogenous zones (*42*, 201).

The Extension of Early Emotional Responses. According to the above investigations, the human being does not innately appear to suffer emotional upsets under situations other than those mentioned. Further affective development occurs by way of the extension of these early emotional responses, through conditioning, to the great variety of situations in which the adult suffers in sorrow, glows with pride, blushes with shame, or trembles with fear. Just as we saw that the dog or horse may employ very subtle cues to release behavior patterns in no way connected with them, so far as the *original* nature of the animal is concerned, so likewise we find that the emotional behavior of the child is tied up by way of *elaboration, differentiation,* and *analogous relations* to objects and events many degrees removed from the *original,* adequate stimulus. Where fear, for instance, is tied up with obviously harmless objects, we speak of "foolish" fear, or, in some cases, of phobia.

An interesting phase of Watson's experimental results was the discovery that children are not innately afraid of animals, furry objects, darkness, and so on. All such fears are apparently learned, or acquired,

through contact with associates or by perceiving these objects simultaneously with situations which released fearful behavior. It is difficult to conceive, however, of the situations enumerated by Watson as constituting the *sole, original* cause of fear behavior in the child. When we realize, for example, the profound biological significance of pain in the life of the individual, in actually determining its very survival, we wonder concerning its potency as a factor in releasing fear behavior in the individual. Should we expect that a young child which, day after day, saw a red-hot poker come out and sear its body, or saw a pair of pinchers appear and lacerate it, would have no fear so long as there was no loud sound or removal of support? Is pain an adequate condition for releasing fear? In discussing this point we must again raise the matter of the limitations of observation. We have tried to make clear the fact that functions are not observed. Emotion is essentially a way in which the organism functions. We infer certain emotional conditions of the organism, rather than observe them. Now what is the evidence?

Observation and Inference. Blanton (7) who worked with Watson in the Johns Hopkins studies upon infants, reports that pain stimuli (lancing finger) caused very vigorous activity and an outburst of lively crying. But such behavior was presumably not fearful. Sherman's investigations upon the naming of emotions show very clearly the rôle of interpretation in this connection. Sherman's problem was to determine whether judgments of emotions were based on observable differences in infant responses, or were inferred from a knowledge of stimuli employed. One group of observers was presented with motion pictures of the stimulating circumstances and the infantile responses, after which they were asked to name the emotion. Another group was asked to name the emotions when shown pictures of the responses only. For another group the stimuli and responses were *transposed* in the film, and the observers were asked to name the emotion when it appeared with a stimulus different from that actually used in the study. Finally, infants were stimulated behind a screen, and then the screen was lifted, and the observer was asked to name the emotion.

From the results of these studies it does not seem that the emotional reactions of infants actually fall into such unambiguous patterns that they may easily be labeled anger, fear, *etc.* Sherman's observers made a great many more "errors" of judgment when the stimulus conditions were not known than when they were known. The judgments apparently rested partly upon factors other than observation. When the stimulus, for example, was painful, the response might be judged as hunger, fear, anger, or "pain," as is shown in the following table. Here

are shown some judgments of responses when the stimulus conditions *were not given.* When the child was stimulated by a needle, it was judged as hunger by 2, as fear by 9, as anger by 8 and as pain by 2 observers.

Actual Judgments	Stimulus Conditions				
	Hunger	Dropping	Restraint	Sticking with Needle	Total Judgments
	Number of Judges Reporting				
Hunger	7	6	2	2	17
Fear	7	5	5	9	26
Anger	11	14	13	8	46
Pain	3	3	4	2	12

Judgments of students to motion pictures of reactions of infants when stimuli were not shown.

Emotional Learning. Should a child come, through learning, to fear some object or situation, it may be gradually returned under proper treatment to its original neutral or indifferent attitude. Various means of reconditioning the child have been employed. Jones lists the following methods: (1) disuse; (2) negative adaptation; (3) verbal appeal; (4) repression; (5) social imitation; and (6) direct conditioning. In the first, the individual is kept away from the object for a time in order that the emotional coloring may disappear through disuse. The child tends to forget its fears, just as the adult tends to forget his emotional up-sets. The second method proceeds under the assumption that constant association tends to breed familiarity and understanding. The individual is repeatedly faced with the fearful situation in order to remove the fear. The third method attempts to familiarize the child with the fearful object by verbalizing about it. The object is talked about or stories are told about it. The assumption is that the child may come to say "pretty creature" or "nice dog," and the verbal statement will remove fear. The method of repression aims to shame or ridicule the fear out of the individual. But there is the danger of setting up attitudes as undesirable as the fear. In (5) the child is left to observe other children at play with, or around, some fearful object. The child may seek to follow them and through constant association with the object without harmful results get rid of the fear. Of all the methods that of direct conditioning is said to be the best. We cite two illustrations of the use of

this method. The first is from Watson; the second is from Jones.

In the following case a child was intensely afraid of a goldfish. It was necessary in order to remove the fear to re-train the child. Watson describes the procedure of reconditioning.

The child, the moment he sees the fish bowl, says "Bite." No matter how rapid his walk, he checks his step the moment he comes within seven or eight feet of the fish bowl. If I lift him by force and place him in front of the bowl, he cries and tries to break away and run. . . . As long as the fish is not present, you can . . . get the child to say "Nice fish, fish won't bite"; but show him the fish and the old reaction returns. . . . Try, however, this simple method. Get a table ten or twelve feet long. At one end of the table place the child at meal time, move the fish bowl to the extreme other end of the table and cover it. Just as soon as the meal is placed in front of him remove the cover from the bowl. If disturbance occurs, extend your table and put the bowl farther away, so far away that no *disturbance* occurs. Eating takes place normally, nor is digestion interfered with. The next day repeat the procedure but move the bowl a little nearer. In four or five such sessions the bowl can be brought right up to the food tray without causing the slightest bit of disturbance (*43*,202).

Jones, too, cites the case of a child which was intensely afraid of a rabbit, a fur coat, a feather, and a bit of cotton wool. Under a process of reconditioning quite similar to the above, the "fear of cotton, fur coats, feathers was completely absent." Moreover, the child showed "a genuine fondness for the rabbit."

From the evidence at hand it is apparent that the basic, neural conditions for many subsequent fears, adult likes and dislikes, and mature emotional up-sets may be established quite early in the individual's life. Consider the following illustrations of early emotional tuning.

A girl of six who had been repeatedly warned not to bring unexpected guests home for luncheon forgot the admonition until she had seated her friend at the table. Her nurse scolded her in the presence of the guest, until her anxiety was very pronounced. On that occasion macaroni and cheese was served for luncheon. Always thereafter, she experienced a sharp sensation of anxiety at the odor of toasted cheese. . . . A man who usually smoked a pipe smoked cigars on such special occasions as holidays and Sundays. His sons were consequently pleasantly conditioned to the odor of cigar smoke. Even when they were grown men, it could still produce in them a feeling of holiday mood (*8*, 22).

Introversion and Extroversion in Children. Marston sought to determine the degree of introversion and extroversion during the first few years (2–6) of an individual's life. Judgments were made con-

cerning the degree of each upon the basis of the child's behavior under the following conditions: (1) social resistance measured by the readiness or reluctance with which the child yielded to the attractions of an interesting toy in the possession of a stranger, the experimenter, who assumed in sequence different attitudes toward the child from complete disregard to cordial invitation to play with the toy; (2) compliance, measured by the child's reactions to the experimenter's request that he open a box with fastenings complicated beyond the child's ability to release; (3) interest, measured by the child's reactions to the many and novel situations of an animal museum; and (4) self-assertion, measured by the perseverance of attempts by the child to obtain a toy for which he had expressed a preference when another toy had been substituted for the preferred toy. From the results of this study it appears that even in these early years there are individual behavior patterns and responses which may be interpreted to indicate a rough separation of children into the three types of introverts, extroverts and ambiverts. There is also evidence that with increase in chronological age there is some decrease in extroversion. This change was more apparent in the girls than in the boys. Finally, "of boys and girls of the same age, the former are the more extroverted."

Stages of Love. According to certain individuals, particularly the exponents of the psychoanalytical school, the individual is supposed to exhibit certain stages during the course of his emotional development. The following account reveals the essential nature of the growth of the child's love-life. During the first few months the infant's needs are mainly limited to food and temperature. If these are properly secured it sleeps most of its time. It has little time for love. As it develops into babyhood, it appears to find much interest in itself. Considerable satisfaction is apparently derived from playing with its hands and its feet. It is, so we learn, in love with its own body. This is the auto-erotic or the highly self-centered stage.

Beginning around the second or third year the child is supposed to project its love outwardly upon those objects, other than itself, which minister to its more urgent desires. The objects may be either animate or inanimate. With time the child in its wider excursions comes more and more into contact with extra-familial individuals. During its growth up to around early adolescence the child is supposed to love members of either sex but more particularly the members of its own sex. The child can only get from being in a state of love with itself to being in love with someone else of the opposite sex by passing through an intermediary stage of being in love with someone else like itself; that is, with

someone of the same sex" (White). Finally comes the third period, during which the love-life of an individual is definitely centered upon a member of the opposite sex. The proper development of the individual's love-life includes, then, according to such accounts, at least three large periods; namely, the stage of auto-eroticism, the stage of homosexuality, and the stage of heterosexuality.

Should the individual in its development find an adequate source of satisfaction within itself it may have an extremely unhappy love-life. If it does not develop beyond the early stage, it will be too self-centered to participate properly in adult life. Should it fixate permanently upon its mother or upon its father, further development may largely cease. As a result, the individual is not drawn toward others and so permitted to complete its life cycle. The danger of mother fixation, it is claimed, is greater for a boy than for girl and greatest for an only son. On the other hand, the danger of father fixation is greater for a girl than for a boy. If the individual fails to make the required shift from the members of its own sex to members of the opposite sex, homosexual behavior may appear. If it weathers all the perils of its developmental journey, it comes to the true end of its love-life.

Masturbation. Where practices such as masturbation exist, improper development may possibly result. It has been shown (*8*, 150) from a survey made of married and unmarried American college women that of one thousand one hundred eighty-three individuals approximately two-thirds reported masturbatory practices in some period in their lives. The number among males is probably even greater. Among women, "The practice commenced for the most part between the ages of five and eleven (forty-two per cent); that is, well in advance of puberty; while before reaching sixteen nearly sixty per cent of those practicing had begun. The mode or peak of the beginning is at the eighth year." Data on males show that such practices among boys apparently start a little later.

We must point out clearly that such practices as these have never been shown to cause insanity, feeble-mindedness or the many other peculiar mental states such as epilepsy, mental stupor, and mania, commonly attributed to them by the grossly ignorant or by those who seek to profit commercially from the fears of the individual. They may, obviously, induce wholly undesirable psychological attitudes in the developing individual; they may lead to quite serious social conflicts; and, according to some, they may result in psychological impotence. In general, the undesirability of such practices should not be underestimated; neither must gross exaggeration or downright misrepre-

sentation of the results be tolerated. A misunderstanding of the nature of such practices not infrequently produces states of extreme anxiety, fear, or self-condemnation, which may do incalculable harm to the immature and the adolescent.

The organic conditions responsible for such practices are laid down very early in the individual in the form of localized bodily regions capable, when stimulated, of giving pleasure. The individual possessed of these possibilities chances, it seems, upon ways of satisfying or pleasing itself, just as it hits upon ways of crawling. And the child without a true realization of the significance of such behavior may establish definite behavior patterns in this connection. Now, one must not, above all, consider as perversion these forms of behavior discovered by the individual and used as means of giving pleasure. To do so seriously reflects upon the child; it also reflects upon the adult's ability to think. It is our distinct impression that not infrequently irreparable harm is done by giving the child a notion that, because it has been guilty of such practices, it is a pervert; or that it is to be distinctly set off from others because of its behavior. In La Rue's opinion, "Much harm has been done by treating boys as serious offenders and by telling them that they were headed for the insane asylum or toward permanent weakness" (*30*, 385). Such behavior, we maintain, can no more be perversive than failing to marry is perversive of some assumed mating instinct. But if one theoretically assumes the existence of a sexual instinct that can normally be satisfied in only one manner; that is to say, if one turns teleological and thinks of man and woman as innately endowed or created to serve certain biological ends or purposes in life such as the production of children in order to perpetuate the race, then any use other than the "predetermined and legitimate" clearly constitutes a perversion. To do so, however, condemns the human being and the animal. For even among the domestic animals we repeatedly come upon striking instances of behavior which we would be forced to label, under the above point of view, as sex perversion—sex behavior in which *mating* is utterly impossible. If we must talk of sex in terms of instinct and perversion, it seems much better, until we know more about the nature and purposes of instincts, never to be too hasty in our interpretation. At least, we must not ignorantly condemn behavior which undoubtedly satisfies the individual, although it may completely fail to serve the ends or purposes for which, so it is alleged, it was solely intended.[1]

[1] In this connection, we wish to quote the following passage from Hollingworth, to make clear the nature of the point of view regarding the sex instinct in the human, which we believe to be most sensible. "The typical human instinct . . . is not a

THINKING (REASONING)

Here again our attempts to write a descriptive account of the child's activity encounter great difficulties, for it is no easy task to dispose satisfactorily of the problem of the development of thinking in the child. If we were to follow many, we would omit entirely any reference to such abilities in a discussion of this nature. Children perceive, imagine, and remember, they would say, but they do not think. Such activities are left to the period of late adolescence or early maturity. Others claim that thinking occurs much earlier. Many discussions clearly turn around the definition of thinking. If it means problem solving, largely at a perceptual level, then the young child unquestionably thinks. And as far as that goes, so does the animal! But if thinking means the ability to manipulate abstract symbols as a means of arriving at an understanding of some event, the matter is quite different. If the child must be able to handle symbols, analyze, discriminate likenesses and differences, make abstractions, draw inferences, see relations, it certainly does very little thinking. Age is required to furnish the materials necessary for thinking; so also is understanding and the proper use of memory and imagination. It is no easy task to select from a mass of material given through perception and memory and imagination, certain relevant items and to order them properly in the light of some problem. And where there is a lack of criticalness, where an individual is fairly suggestible, where factual materials are inadequate, where no clear end can be held in view, and where ignorance of the many possible sources of logical error exists, as in children, very little reasoning may be expected.

Moreover, in order to think, there must be motivation, and very few children can be shown a need for thinking. As one has it, "Children believe a thousand things before they question one." The average child is, of necessity, trusting. It has been forced to trust, or it would not exist. Where there is trust, that is, where there is unquestioned acceptance of authority, no thinking is called for. Parents continually insist upon their right to guide the child. It is told how, when, and where to dress, eat, walk, talk, and sleep. It almost seems as if it were jealously protected from situations which might possibly offer thought

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specific pattern of activity originally determined by neural patterns laid down by heredity in the brain. It is a vague unrest, based on the incipient functional activity of some organ or mechanism, which may be satisfied in any way which occupies the restless member. The sex instinct is such an activity. There is a definite mechanism, neuro-muscular, glandular, and vascular, which is easily stimulated to incipient activity. This preliminary activity is impulsive, constitutes a vague unrest, and the various possible modes of removing or satisfying this motive must be learned by experience" (*22*, 298).

problems. Children are given models to follow in almost every line except thinking, and society sees that the child follows them. The adult members of the family, then, are partly responsible for the lack of thinking by the child. They try to do its thinking for it.

We can unquestionably agree that in the normal individual the ability to think develops with age. We do not go to children for solutions of our current social, economic, political, industrial, and scientific problems. We go to adults possessed of a wide background of experience and a store of factually correct material upon which to draw in the solution of the problems. In the same way we do not go to a world-famous mathematician for a solution of historical problems, or to an outstanding chemist for a solution of social problems. We assume, generally speaking, that the individual starts lowly and after a number of years gradually reaches, under rigorous exercise, a place where he may reason accurately. Many may never reach such a stage. A few may come to it quite early. One has but to hear some adult friend or acquaintance generalize from some casual observation under uncontrolled conditions to realize how fearfully easy it is to go wrong in thinking. Children, we know, *develop* into thinking adults. They do so by making greater use of the function upon various occasions; that is, by thinking more frequently, and by thinking more accurately about problems.

THE DEVELOPMENT OF LANGUAGE IN THE INDIVIDUAL

Growth in the ability to employ oral language in communication and understanding has long been an interesting problem for the psychologist and others concerned with the child. A study of the development of speech in the individual is valuable for several reasons. According to some, it has racial significance. An understanding of its development in the *individual* contributes to our understanding of the growth of language in the *race*. The child in its acquisition of speech is supposed to recapitulate in a rough manner the development of language in the race. Others find it of interest because of the light it presumably sheds upon the intelligence of the individual and upon his ability to establish habits. As we have pointed out, the intellectually subnormal individual is supposed to talk later than the more intelligent child. The growth of language is symptomatic of the growth of intelligence. Again, the problem is of interest to the special student of linguistics. It gives him, for example, an opportunity to secure information about racially common elements of speech as well as a chance to study the actual formation of speech habits. He may, for example, study the relative difficulty of producing various word sounds—whether

some verbal habits are more difficult than others to establish. To others, speech is one phase of child activity. It is one of the most important of the various behavior patterns. For it gives the individual a command over his environment not equalled in any other single manner. We have now to consider for a moment certain outstanding features of the development of speech in the child.

Early Sounds. The individual comes into the world with a "cry of pain or a gurgle of pleasure" and it leaves at death with a moan of sadness or a sigh of relief. These are the beginning and the end of his vocal career. For the first few weeks of a human being's life, the primitive *a* cry, so characteristic of infancy, appears to come at times quite spontaneously; at other times it seems to be elicited under a fairly wide variety of conditions, among which we may mention those of hunger, pain, high or low temperature, being held tightly, and fatigue. These cries are recognizably different in different individuals, even during the first day after birth. Within a few weeks these cries become clearly differentiated, in the same individual, under unlike conditions of stimulation. The hunger cry, for example, is different from the colic cry. They are different in pitch, duration, and grouping. The colic cries, for instance, do not appear to be so clearly grouped as do the hunger cries. The contractions of the stomach appear to cause the hunger cries to fall roughly into repeated patterns. In addition to these simple cries there are, by the end of the first month, other sounds very difficult to label. One might call them squeaks, grunts, coos, yells, or squeals. Some of these are as follows: "*u, na, waw, wuh, ma, nga, gah*" (Watson). By the end of six months, according to studies made by Gesell, "There were one hundred four separate movements of vocalization during the day, varying in complexity from a one-letter sound to thirty-two repeated syllables; seventy-five sounds and combinations of sound were used." A few types of these sounds and the relative *order* in terms of number of times given are as follows: *da, aba, ngrt, ada, uh, u, de, ng.* These are repeated time and again. It is as though the individual actually derived keen pleasure from hearing its own voice. Development this far, according to some writers consists of three overlapping stages. There is the reflex stage of the simple cry; there is the second stage of cry differentiation; and there is the third stage of babbling or mere vocal play. Out of such primitive vocalization, common to all races, come the materials for the various languages.

While yet within the babbling period and toward the end of the first year, the child may enter upon the fourth stage in which it begins to reproduce sounds made by its parents, its brother and sisters, or

objects about it. Once started, it may repeat the sounds, again and again, in an almost "stereotyped" manner. In this way, no doubt, valuable training in the production of sounds is secured, and the basis for later language learning is more firmly established.

Sounds Tied to Needs and Objects. The first real step in acquiring the actual language of the group is the tying up of certain of the sounds heard to individual needs, desires, and to environmental objects, events, or situations. The child, we say, is now beginning to understand. This process is at first a gradual one. Certain sounds must be repeatedly heard in connection with the satisfaction of needs, before they become closely tied up with the need itself. The next step is for the child to attempt the production of these sounds when experiencing these needs or when seeing the objects with which these sounds were previously linked. These first attempts are frequently very curious. Anyone who has heard baby talk is familiar with their character. We might say that frequently as much learning is required by the parent in order to understand the child as the child requires in order to understand the parent.

These early sounds may be run together, according to Major, to form a sound sentence in which there may not be a single recognizable word of the adult vocabulary. Development from here on consists largely in the formation of words clearly similar to those of the adult and which have object or situational significance. Many of the early words of the child may be put to several uses, depending upon the particular situation. The word "papa," for example, may mean "(1) come play with me; (2) please lift me up; (3) please give me that; (4) help me get up on the chair; (5) I cannot," and so on. Instead of expressing its wants with one word the child gradually comes, after a time, to put together two words, three words, and more. Consider for a moment what is actually required in terms of learning in order that the child may be able to speak a meaningful sentence. The child has to discriminate between the thousands of sound combinations. It has to perceive the *relation* between sounds and objects, events, and situations. It has to develop coördinations; that is, set up verbal habits by means of which it produces sounds which stand for objects, events, and situations. It has to be able to bring just so many word sounds together in a sentence —not too many and not too few. It has to order them one after the other and inflect them properly. Here is, indeed, a stupendous task. And when we read that "from 30 to 100 new words a month is not an unusual rate of learning after the acquisition of language fairly begins," we have a faint conception of the high degree of plasticity in the learning mechanism of the child.

Children's Vocabularies. Many attempts have been made to determine the number of words used by children at various chronological ages. A compilation by Gerback of 19 vocabulary investigations made prior to 1917 shows a range of a half-dozen words at eight months to 6,837 words at 5 years. The average, of course, runs much less than this. Around two years of age the number of word habits may range from a score to several hundred, depending upon the training which the child has received, upon its intelligence, and upon its oral equipment. By the time the average child starts to school, it probably has a vocabulary around 2,500 words. By the time it is ready for junior high school it may have around 6,000 words, and when it matriculates in college, the normal number is probably around 12,000.

Of all the various parts of speech employed by the child, the number of nouns seems to predominate. One reason for this is that the child appears to make use of nouns, in so many cases, as verbs. Judging from its language and from the definitions which it gives of objects, the child apparently perceives objects as having functional significance.[1] Thus, the chair is something to sit on; a dress is something to put on; a bed is something to lie down upon. Then chair may mean "to sit down," dress may mean "to put on," and bed may mean "to lie down." The following data from Major show the relative frequency of the various parts of speech for three different periods.

Period	Parts of Speech										
	Nouns	%	Verbs	%	Adjectives	%	Adverbs	%	Pronouns	%	Total
Second year . .	120	83	8	5	2	1	3	2	..	..	143
25th to 30th months..	213	69	56	18	14	4	12	4	..	..	308
31st to 36th months.	261	46	163	28	81	14	43	7	8	1	564

[1] Some animals are assumed to perceive *objects* as being functionally significant. A pretty illustration of this may be taken from the behavior of huge apes. Two apes are in a cage from the top of which food is suspended. In order to secure the food a box must be employed upon which the animal stands. One of the apes climbs upon the box and lies down. The other ape seeks to secure the food. No attempt, however, is made to employ the box. After a time the recumbent ape leaves its bed upon the box. The other ape immediately draws the now unoccupied box over in place and secures food. It is assumed that so long as the one ape lay upon the box the other ape perceived the box as *something-to-lie-upon* but not as a *way-to-food*. However, when the box was free from this lying-upon meaning, it could take a *means-to-food* look and so be used.

SENESCENT CHARACTERISTICS

We have sought to point out certain of the most salient features of the developmental moments of an individual's earlier life. We wish now to turn for a brief glance at the other end of the life journey: to that period during which the individual may again exhibit pronounced psychological changes. Here the individual may lose a great deal of that which was slowly gained during his earlier years. As we should expect, not all persons who attain to a ripe old age pass through a pronounced period of psychological decline. Some show slight changes while others close their lives at the end of a period marked by enormous psychological losses. It should be recognized that there are as great individual differences at this extreme as are found at the other. Some individuals decline more slowly and some more rapidly in the same way that some children grow more slowly or more rapidly than others. Some persons appear to reach the peak of their functional attainments quite early; and then, after a time, start downhill. Others seem to keep going on, up and up, constantly thrusting away the insistent clutch of old age.

Significant Changes. As a rule, the individual growing old is not permitted to forget his age. A great many institutions apparently proceed upon the assumption that men who attain the age of 65 have passed their period of usefulness. Perhaps the compulsory retirement at an age at which a man may still be quite productive serves occasionally to actualize the imminence of old age. It is perhaps possible that such compulsory retirement with its resultant inactivity and obvious thwarting may occasion the onset of rapid psychological decline. The individual has nothing for which to live. He lets go. The clearest picture of the inroads of old age upon the psychological organism is obtained from the case of those changes which occur in the exaggerated state of decline known as senile psychosis.

During the period of senescence bodily changes of an outstanding sort become apparent. The skin loses its elasticity, the muscles weaken and atrophy, the fleshy padding around the bones tends to be absorbed causing characteristic changes in appearance and bodily contour. Significant internal changes occur by way of a loss in bodily regulation of the vital functions. The duct and the ductless glands, especially, appear to show decay, or non-functional periods. In all cases the vigor and vitality of earlier days are lacking. This loss may be attributed largely to (1) a decided decrease in muscular tonicity; (2) the failure to eliminate toxic materials so that the organism becomes poisoned; (3)

the improper functioning of the assimilatory mechanism so that the organism fails to secure proper nourishment; (4) the decrease in the glandular functions; and (5) the impairment of the central nervous system.

It appears that the feelings of vitality which one experiences under organic soundness during one's younger days are mainly attributable to the heightened tonicity of the muscular system, both of the striped and unstriped muscles. The individual's reaction system, we say, is "tuned up." In old age, however, the muscles apparently appear to be in a greater state of relaxation. One feels "draggy." Again we know that the excretory mechanism suffers with age. It is frequently the first to wear out. The organism now becomes impregnated with the residues of organic activity. The body no longer frees itself from its waste products. These toxic materials show their presence in the body by way of increased sluggishness, by loss of mental ability and by change in the color of the skin. There are, moreover, digestive inadequacies. The food is no longer absorbed as in younger days. The appetite is impaired. Old persons lack the zest for food, such as is found in the child and in the younger adult. Some have gone so far as to make old age a function of the alimentary canal. Hence, a man is as old as his food tract. So long as this is kept in working order, the individual is able to ward off other attacks. Those who think in terms of glands would put the blame for old age largely upon the endocrine system. If it fails to work properly, the organism declines. There is no doubt but that this sort of loss which many persons increasingly suffer with the added years actually serves in part to determine the age of the organism. One has but to turn to accounts of revived behavior patterns under renewed glandular activity to secure evidence of the striking changes produced through the medium of the ductless glands. Whether such results have a degree of permanency warranting the employment of those methods sometimes used to produce them is another matter. On the whole, it would seem that the methods of rejuvenescence have been somewhat exaggerated. The results are frequently ephemeral. Finally, we find gross changes in the structure of the central nervous system. "In advanced cases of senility there is a smoothing out of the cerebral convolutions, a deepening and broadening of the brain fissures. The interior brain cavities expand and the amount of spinal fluid increases. Gross changes in the nerve cells are also found." The following data from Ladd and Woodworth show the differences in brain weight of men at various ages. After 65, the brain weight appears to decrease rather rapidly.

Number of Individuals	Ages	Average brain weight
32	25–55	1482
33	56–65	1492
24	66–75	1448
15	76–89	1389

Psychological Signs of Old Age. But the changes which are of most interest to us are those in which behavior patterns are concerned. Such bodily modifications as we have briefly outlined could not possibly occur without entailing significant psychological changes. We recognize that the perceptual abilities of the senescent are slowly lost. Hearing appears to be quite early affected. There is a saying in some parts of the country of the middle aged individual that "he can't hear a bat squeak." The perception of high tones apparently disappears first. With increased age there comes a more general decrease in auditory keenness. The process may continue until the individual, losing contact with its auditory world, gives the impression of being stupid. Taste perception, too, suffers. In early childhood the organs of taste appear to be widely distributed over most of the oral surfaces, even extending into the upper throat. The young child that stuffs its mouth full is not to be considered as gluttonous; it merely gets more "taste" by such cramming. As old age advances, there occurs a general dulling of those organs, so that the individual no longer enjoys the gustatory delights of former days. Old people will attest to the fact that while eating may still satisfy hunger, food does not taste as it used to. The olfactory perceptions do not retain their earlier strength. They, too, decline with the passing of the years. Again, as we should expect, the gradual hardening of the skin, characteristic of old age, appears to mar the delicacy of the tactual senses. Of all the perceptual changes those which occur in vision are perhaps the most outstanding. The individual may gradually lose visual acuity until sight is partially or completely gone. The eyeball hardens so that it is no longer capable of being molded by the ocular muscles.

But the decline of all of the perceptual functions is not the saddest of the picture. If the individual were merely deprived of such functions, the story would not be so bad. The occurrence of deterioration in some of the other abilities is more serious.

One of the earliest and most significant symptoms of the onset of senility is a loss of memory, especially for the more recent occurrences. The ability to recall the more remote experiences very often remains unimpaired for a much longer time. Thus the order of loss is the reverse of the order of acquisition. The first acquired is apparently the

last to go. As a result of this disturbance of memory the individual is largely cut off from his present world because of his forgetfulness of what has just occurred. For instance, the individual may be conversing with another but after a few moments of delay he may start in again as if no previous conversation had occurred.

This disturbance of memory is usually progressive, so that the individual constantly exhibits an increasing loss among his memories. Actional control, too, may go so that the person becomes more and more childlike in his behavior. He may, in fact, become quite helpless.

Another very frequent and early symptom of the onset of senility is a clear disturbance in the emotional life. The individual may become quite irritable, intractable and unduly excitable under minor situations. He may show violent abusive spells. Again he may exhibit marked melancholia. The individual may be plunged into depths of despair and gloom. He is quite apt to develop mild delusions of a depressive and persecutory nature. He believes that no one treats him decently. His own children are against him. There is nothing left in life. Judgment and reasoning become greatly impaired. The individual is impervious to argument. One cannot even gain the attention long enough to discuss problems. If the attention is secured it is only for a moment; then it is gone. Of the nature of this serious decline with increasing age, Pressy (*35*, 196) writes that it is progressive until death. Many persons reach "a condition of complete dementia—they know no one about them, are confused, indifferent to everything, can remember nothing. Death usually results from pneumonia or other intercurrent disease that the patient is too old and worn out to resist." If not utterly helpless, they usually desire nothing more than to be left alone to sit by the fire and wait for death to relieve them.

BIBLIOGRAPHY

1. Adler, F., *The Moral Instruction of Children.* 1893.
2. Arlitt, A., *Psychology of Infancy and Early Childhood.* 1928.
3. Baldwin, B., "Physical Growth of Children from Birth to Maturity," *Univ. of Iowa Studies*, 1920, I, 1.
4. ————, and Stecher, L., *The Psychology of the Preschool Child.* 1925.
5. Bentley, M., *The Field of Psychology.* 1924.
6. Blanchard, P., *The Child and Society.* 1928.
7. Blanton, M., "The Behavior of the Human Infant during the First Thirty Days of Life," *Psychol. Rev.*, 1917, *24*, 456.
8. ————, and Blanton, S., *Child Guidance.* 1927.
9. Burnside, L., "Coördination in Locomotion of Infants," *Genet. Psychol. Monog.*, 1927, *2*, 284.
10. Cameron, E., *Educational Psychology.* 1927.
11. Cameron, H., *The Nervous Child.* 1923.
12. Compayre, G., *The Intellectual and Moral Development of the Child.* 1900.
13. Dashiell, J., *Fundamentals of Objective Psychology.* 1928.

14. Donaldson, H., *The Growth of the Brain.* 1896.
15. Drummond, W., *An Introduction to Child Study.* 1907.
16. Gerbach, F., "Vocabulary Studies," *Colo. Coll. Stud. Educ. and Psychol.* 1917, I.
17. Gesell, A., *The Mental Growth of the Preschool Child.* 1925.
18. Goodard, H., "The Adaptation Board as a Measure of Intelligence," *Train. Sch. Bul.*, 1914, II, 1.
19. Groves, E., *Personality and Social Adjustment.* 1923.
20. Herrick, C., *Brains of Rats and Man.* 1926.
21. Hollingworth, L., and Montague, H., "Comparative Variability of the Sexes at Birth," *Amer. Jour. of Sociol.*, 1914, *20*, 335.
22. Hollingworth, H., *Mental Growth and Decline.* 1927.
23. Jones, M., "The Development of Early Behavior Patterns in Young Children," *Ped. Sem.*, 1926, *33*, 537.
24. ————, "Elimination of Children's Fears," *J. of Exper. Psychol.*, 1924, *7*, 382.
24a ————, "Conditioning and Reconditioning," *Nat. Ed. Ass.*, 1924, *62*, 585.
25. Kirkpatrick, E., *Imagination and Its Place in Education.* 1920.
26. ————, *The Fundamentals of Child Study.*
27. Koffka, K., *The Growth of the Mind.* 1925.
28. Kuhlman, F., *A Handbook of Mental Tests.* 1922.
29. Ladd, G., and Woodworth, R., *Physiological Psychology.* 1911.
30. La Rue, D., *Mental Hygiene.* 1927.
31. Major, D., *First Steps in Mental Growth.* 1906.
32. Marston, L., "The Emotions of Young Children," *Univ. of Iowa Stud.*, 1925, III, 3.
33. Mateer, F., *Child Behavior.* 1918.
34. Norsworthy, N., and Whitley, M., *The Psychology of Childhood.* 1918.
35. Pressey, S., and Pressey, L., *Mental Abnormality and Deficiency.* 1926.
36. Preyer, W., *The Mind of the Child.* 1903.
37. Reymert, M., "The Development of a Verbal Concept of Relationship in Early Childhood," *Scand. Sci. Rev.*, 1923, II, 2, 32.
37a Sherman, M., "The Differentiation of Emotional Responses in Infants," *J. of Comp. Psych.*, 1927, *7*, 265, 335.
38. Stern, W., *Psychology of Early Childhood.* 1930.
39. Stutsman, R., "Performance Tests for Children of Preschool Age," *Genet. Psychol. Monog.*, 1926, *I*, 1.
40. Terman, L., "An Experiment in Infant Education," *Jour. of App. Psychol.*, 1918, II, 218.
41. Waddle, C., *An Introduction to Child Psychology.* 1918.
42. Watson, J., *Psychology from the Standpoint of a Behaviorist.* 1919.
43. ————, "Behaviorism: A Psychology Bases on Reflexes," *Arch. of Neur. and Psychol.*, 1926, *15*, 185.
44. Weiss, A., "The Measurement of Infant Behavior," *Psychol. Rev.*, 1929, *36*, 453.
45. White, W., *The Mental Hygiene of Childhood.* 1923.
46. Woodrow, H., *Brightness and Dullness in Children.* 1919.
47. Woolley, H., *An Experimental Study of Children.* 1926.
48. ————, "Personality Studies of Three-Year-Olds," *J. of Exper. Psychol.*, 1922, *5*, 381.

CHAPTER VIII

THE PSYCHOLOGY OF THE GROUP

Man is a highly social animal. He is born into a group, and his growth is marked at every step by direct and intimate contact with others of his kind. His very existence seems literally to hang upon the behavior and attitudes of others of his own sort, for his contacts with them unquestionably make or break him. The nature of his contacts with others determines whether he will be shy or bold, coöperative or individualistic, boastful or modest, moral or immoral, sympathetic or indifferent, as well as a host of other traits. As a child the individual is apparently non-social, but in a comparatively short time his behavior begins to show a definite social coloring. With time he comes to perceive, to remember, to act, and to feel with reference to others. With increasing age, such traits as understanding, sympathy, greater friendliness, concern, and affection for group associates gradually appear in his behavior. He finds laughter in the joys, and tears in the troubles of others. He discovers in the company of others a source of satisfaction, and in the absence of this companionship he is restless and unsettled. He comes, in time, to share his simple possessions—his toys, his food, his "back yard"—with his companions. Somewhat later he shares his clothes, his money, and his car. Since his behavior patterns from his earliest days involve him in such close contacts with others, it is impossible to derive an understanding of his psychological nature unless we include a reference to the social aspects. We are thus brought to realize that the human adult is the product of the operation of many factors of which no one is more important than the social.

Stages in Socialization. Some who recognize the tremendous influence of socialization upon the course of the individual's development have sought to divide his life span into a number of stages in terms of the more outstanding changes of a social character. Kirkpatrick, for instance, cites six such stages (*18*). There is first of all a *pre-social* period during which the child "is influenced by things and persons, as are animals, in an almost wholly objective way." It is largely or wholly unaffected by the social behavior of those around it. This stage is followed by the *imitative* and *socializing* period, during which time the

child learns to walk and talk and "becomes more susceptible to the mental influences" of those around him. His behavior during this period takes on a more distinctively social tinge. He apparently begins to realize his dependence upon others; especially does he learn ways of directing the attentions of others to himself—thus satisfying some of his insistent needs. In the *individualizing* age, which lasts from three until about the time he starts to school, his own personality develops rapidly. He becomes more clearly individualistic. From six until around twelve the child is said to live in the period of *competitive socialization.* Now his field of activities is greatly widened, and the parental restraints of earlier years are somewhat eased. He comes into contact with many of his own age and class. He tries out his abilities in competition with others in the classroom and on the playground. In these years many of the fundamental conditions for future socialized behavior are laid down. If his contacts now with others are not happy, he inclines strongly to develop faults either of withdrawal, shyness, and backwardness; or of domination and bullying as a means of covering up his social deficiencies. Habits of leadership or of "following" ripen rapidly during these years. Of this period Hollingworth writes as follows:

Scorned by the older adolescents, with their growing love interests; and in turn scorning the juveniles who are still in the care of nurse or under the watchful eye of the elders, or are physically unable to partake in the "freer life" of sport, they exploit such opportunities as the environment affords. The distinct modes of dress, of deportment, and of early playthings, all foisted upon the young by the supervision of the elders, now lead to a fairly distinct cleavage between the two sex groups. Boys flock together, in their gangs, clubs, and teams. Girls play together at their parties, and do the best they can, under the more watchful concern of the elders for their innocence and "femininity." Antagonisms often spring up between the two groups, and such active relations as are established are likely to be in the way of teasing, bantering, and jealous competition.

Social pressures which seek to establish sex-determined standards are strong at this age, and ideals of conduct for the two groups are clearly motivated by the realization of the possible dangers of faulty habits, premature sex activities, and the fact that such activities commonly have more overt consequences to girls than to boys. That these motives are not articulate in those who foster the respective "ladylike" and "manly" ideals may well be, but it is biological consequence that forms the basis for the long recognized "double standard" of morals, and this double standard begins to assert itself even earlier than these days of free play activity.

The plays of the free eleven-year-old are strongly social, in the sense that they involve many players. Elements of individual competition are strong;

organized team play is often attempted, probably on the basis of imitation and adult suggestion, but such efforts commonly degenerate into "all-star" performances. There is lively individual competition, which tends to be discouraged or given less overt forms in the usual supervision of girls. Boys freely compete in speed, strength, endurance, fortitude, courage, and cleverness. In their free masonry loose organizations also spring up, in competition with other loosely formed groups, these being the much discussed gangs of small town and city life (*17*, 200).

From twelve to eighteen the individual passes through the so-called *pubertal* stage during which a wide variety of social patterns appears. The individual may become solitary and misanthropic, or fired with a strong ambition to re-create his social world.

The radicalism and revolt of youth have become by-words of common speech. The elders cleave to institutions devised to serve their own needs. Newer needs and practises they only tolerate, but youth is in the midst of these novel events. In a changing world the cherished perpetuation of old techniques annoys. Thwarted by many aspects of the old régime, intellectual youth may rebel against it entirely, and strive to fashion a new régime based on its own needs and insights. Revolt even against the individual's own make-up is common, and adolescence and the immediately subsequent years constitute the great age for voluntary reshaping of the individual personality to conform to its own standards. On this impulse correspondence schools and publishers of volumes on quick methods of attaining will power, beauty, and charm flourish (*17*, 242).

At this time the members of the opposite sex come to possess great attractive powers.

Although common games of the team sort, permitting the participation of boys and girls jointly do not commonly develop, there are many play activities which permit the expression of individual preferences for one another and the indication of special attachments. Dancing is the most common of these.

There is also a tendency for boys to organize games and enterprises at which girls will be spectators, thus affording play for impulses of display, involving skill, strength, and courage. The onlooking girls may also vie with one another in the display of charm of person or of dress. . . . As society is at present organized, at any rate, it is in and just after adolescence that the "strutting" of the male and the "coquetry" of the female show their most vigorous development. All this is part of the wider socialization which leads finally to the institutions of the new generation, and paves the way for the "institutionalization" and complacency of the adult (*17*, 245).

The individual may now set up social attitudes with regard to members of the other sex which endure throughout his whole life. Some great blow to the individual's love nature may result in a permanent

blighting of the usual interests in the opposite sex. He may thus lay the basis for a later "souring" on the world and especially on the members of the other sex. During the period of later *adolescence* which now follows, the individual takes up the dinner pail or passes through college and enters "the larger world of thought and action and becomes prepared to take his part in the various activities of the race."

These suggested stages give us intimations of profound changes of a psychological nature which occur in the individual during his more formative years. They are not so much descriptions, however, of the psychological changes which occur under socialization. Our first task now is to depict in a general manner the ways in which the individual becomes socialized; that is, to point out the character of the changes which may properly be said to constitute socialization. We shall be concerned with the problem as to how the individual performs as a member of a group, or with the effects of other human beings upon his psychological activities. During this part of the discussion we shall not be concerned so much with the social group itself. That we come to a little later.

Is There a Social Mind? If we were to follow some writers, we should address our descriptive attempts mainly toward a social mind. But even though we were inclined to talk in terms of mind, we should be forced to reject the concept of an independent social mind that develops under social stimulation and by virtue of which the human individual enjoys membership in the group. There is no acceptable evidence which might lead us to believe in a unique social mind that is thrown into operation in some strange way in the presence of another human being. Neither shall we accept the notion of a social sense that is sensitive to social stimuli. We are inclined to hold to the various senses described in textbooks of Elementary Psychology, and to forms of stimuli which are physical and chemical—not social—in nature. Moreover, we shall not seek to describe a group or crowd mind such as is assumed by some to exist as something more than the mind of the individual. McDougall, who finds it convenient to think in terms of a collective mind, remarks as follows:

> Although we may refuse to admit any modes of communication or influence between minds of various individuals other than through the normal channels of sense-perception and bodily movement, we must, nevertheless, recognize the existence in a certain sense of over-individual minds or collective minds. We may fairly define a mind as an organized system of mental or purposive forces; and, in the sense so defined every highly organized human society may properly be said to possess a collective mind. For the collective actions which

constitute the history of any such society are conditioned by an organization which can only be described in terms of mind, and which yet is not comprised within the mind of any individual; the society is rather constituted by the system of relations obtaining between the individual minds which are its units of composition. Under any given circumstances the actions of the society are, or may be, very different from the mere sum of the actions with which its several members would react to the situation in the absence of any system of relations which render them a society; or, in other words, the thinking and acting of each man, in so far as he thinks and acts as a member of a society, are very different from his thinking and acting as an isolated individual (*21*, 230).

From the point of view of a collective mind, we read of a race mind, a church mind, a party mind, and the like to which each individual contributes a share. But we believe that these terms are largely figures of speech to refer to permanent social institutions which are not material, and yet which outlive the individual human members who may share with each other the cultural associations represented in these institutions. Races, for example, differ in culture, and the degree to which a member participates in this culture determines his degree of socialization.

The Psychological Functions Are Socialized. We shall assume here that the whole organism is a highly integrated structure that functions in various ways and that these functions are different under social contacts from what they would have been if such contacts had been lacking. The psychological functions of the organism—namely, perception, memory, imagination, action, emotion, and thinking—are socialized. Now these are exactly the same abilities which the human individual employs in securing knowledge about objects and events in the environment. There are no new functions operative in a social environment. But behavior which is socialized is wholly different from that which is non-socialized. Under socialization an object becomes seen, heard, felt as being different from the same object experienced as lacking such socialized aspects. The object is now one to be left alone because of another, to be shared with another, to be carried to another, to be kept from all others, and so on. Such an object exhibits, then, not only the ordinary qualitative and quantitative aspects, but it also shows social characteristics. It refers to situations, places, events which concern human beings. Thus an object—a rose, a book, a jewel, a bit of paper—which under certain conditions might go unperceived or be indifferently viewed, now brings a blush of shame or a quick lift of the head in pride, a look of sorrow or a flash of anger. Sympathy, loyalty, honor, as well as many other like forms of behavior,

become closely and intimately tied up in this way with situations and events. Stripped of their social significance, such situations and forms of behavior become meaningless, for they are truly social in character.

The reference in all forms of social relations is to some person or member of the species. The human individual does not become socialized by his contacts with animals and inanimate objects.[1] We do not believe that man ever forms a social group with minute subhuman forms such as vermin, or with large animal forms such as cows. Moreover, even under close contacts, we may find very little of a true social nature between some human beings. Very young children do not evoke in us such social feelings as modesty, shame, rivalry, or emulation which we so clearly experience in connection with adult individuals. Nor apparently do such references exist toward those persons long regarded as wholly and distinctly inferior. Although belonging to the same species there may be between master and slave, for instance, no more modesty, shame, rivalry, or loyalty than is found between a man and a beast of burden.

Very frequently the reference under socialization is no more than the significance connected with such statements as "This is our school," "I wonder what sort of man made this?", "Do you know that person?", "May I take his book to him?", "Who gave that to you?", "I do not like her dress," "He belongs to our dancing class." That is to say, social reference in a great many cases does not necessarily require detailed verbalization or elaborate thinking. It is a striking fact that in many cases the social reference may be as immediate as the perception of size or shape. For instance, I am waiting for a friend to come in a car. I look down the drive, and I see a car approaching. It is immediately perceived as a car bringing my friend. If I were asked a moment later to describe the car, I might have great difficulty in doing so. But the car definitely meant my friend. Or to show how deeply our social perceptions are engrained in us we need but come suddenly and unexpectedly upon another human being. Social reference here, as in many other cases, is often as immediate as the perception of the size and shape of the individual.

[1] Allport expresses a position somewhat different from this. "A social stimulus," he tells us, "is any movement, expression, gesture or sound—in short, any reaction, made by an animal (human or infra-human) which produces a response in another. We should perhaps extend this definition to allow for the fact that the mere presence of an individual under certain circumstances may serve as a social stimulus. As a rule the individual whose behavior serves as a social stimulus and the individual who responds belong to the same species. There are many exceptions, however, such as the cat which reacts to the movements of a mouse by crouching and stalking, or the man who understands and responds to the barking of his dog or the nervousness of his horse" (*1*, 147).

We not only perceive, but we remember and imagine in a social way. The bit of old ribbon, the pressed flower, the lock of hair, the engraved cup, and a thousand other trinkets saved from earlier years are clothed by the human organism in social references. Memories that "bless and burn" cluster warmly around and suffuse them. Here is a depth of social meaning borne or released by quite simple objects. Such objects stripped of social significance immediately become utterly worthless—mere bits of waste. Emotions, too, become greatly socialized. Of them Bentley writes:

> Taken as a class the emotions are widely and deeply socialized. Their predicaments are largely . . . social predicaments. Either the predicament is ıred, as in the terror of the earthquake and the grief of war, by a group, or else the situation which leads to an emotive crisis is itself a social situation, as in jealousy, anger, and contempt. For we must not make the mistake of regarding all socialized emotions as shared. The solitary grief of the afflicted is every bit as socialized (since it involves a personal reference) as was the shared grief of the Trojan women. And such self-referring emotions as envy and jealousy strike the same high note of socialization as do the rage of the mob and the resentment of the protestant mass meeting. Although men are constantly oppressed by the struggle with inanimate nature, most of their typical emotions seem to be reserved for *social* predicaments. Of course, we must not confuse social unity and consolidation with socialization at large; for those predicaments which set us into antagonism or competition with our fellows are just as highly socialized as are the more comfortable emotions of understanding and amity (*2*, 461).

Finally, we have such activities as understanding and thinking socialized. The latter, however, tends of all of the functions to be least affected by socialization. It demands the clear headedness of solitude rather than the solicitude of close associates. In all cases socialization consists largely in possessing, or in sharing, either objects such as a new car, a bit of statuary, a picnic lunch; or scientific topics and thought problems such as the ways to stabilize currency, to prevent crime, or to improve the human race. In all these instances it is the object or the problem, perceived or thought about, which is socialized and *not the human mind.*

Socialization a Slow Process. Socialization, while progressive in the individual, is a process of fairly slow growth. One does not become socialized over night. Those who have grown up under conditions, such as remote rural regions provide, which offer few chances for human contacts and the exercise of the psychological functions in a social way, usually show very clearly the effects of social isolation upon behavior.

To such persons, if we may cite a simple illustration, food objects may not be perceived at all as something to be shared with others; there may be no social reference in such cases. Moreover, such persons may fail after a long time to achieve a very high degree of socialization. Of course, one might possibly grow up actually in close contact with others but in a wholly selfish manner so that there might again be no reference, in terms of the above illustration, to other persons.

Furthermore, socialized behavior patterns are at most times laboriously established. Persons in authority in social groups employ many agencies and spend much time and energy, particularly during the more formative years of the individual's life, in the task of engraining such patterns deeply into the individual. And the results in all cases vary widely. Different persons under the same gross environmental situations exhibit large differences in degree of social behavior patterns. Some are more, some are less, socialized.

We turn now to consider in some detail the necessary conditions, or causal factors of socialization. That is, we raise the fundamental problem of why men are actually social. By what reasons does man's daily behavior exhibit evidence of the desire for social contacts: perceptual, memorial, emotive, and the like? Why does he, for instance, exhibit shameful, or sympathetic, or coöperative behavior?

CAUSAL FACTORS OF GROUP ASSOCIATION

We approach here the sources of socialized behavior. Since such behavior of necessity involves both a long individual and racial history, the problem is very knotty. The adult, we have said, is a product of many diverse forces. It is an exceedingly difficult problem, therefore, to indicate precisely those agents to the operation of which we may safely attribute his sociality. But let us at least attempt a statement. Let us seek an answer to the problem of the nature of the conditions which have tended to draw men into association with each other and which have, therefore, contributed to the development of social relations. What factors can we discover in his biological and psychological constitutions, or in his history, to account for his present social tendencies? How far back must we go in order to arrive at the beginnings of the forces which have made him a social creature?

Now we take for granted that the human being is a product both of simpler organisms and a complex process. We discover its antecedents among the animal forms. Can we likewise discover in the animal series any antecedent and contributory conditions of human relations of a social sort; or must we attribute man's sociality to some distinctively

and uniquely human trait or character? We might, of course, assume without question that man's social life is to be directly credited to the animal in the same way that we attribute his body, and so let the problem rest. Thus we might agree with Allport that "it is from the origin and development of social life among the lower orders that a fuller understanding of the human aspects may be gained." But as we shall shortly try to point out we are somewhat inclined, from the evidence at hand, to question such a position. We must glance briefly at the animal series to see if it holds the secret of man's social life.

Physical Contact Does Not Always Socialize. When we leave the human province and go to the animal to determine whether the antecedents of human social relations may be found to exist there, we immediately encounter the difficult problem of properly defining the limits of the social. What shall we say is social and what is not social? Shall we say that all *aggregations* of organisms are social in character, so that wherever a number of creatures are brought together into close physical proximity, we have social relations or a society established? Some writers appear to think so. But against such a view we have the obvious truth that although one human being may be thrown into close physical contact with others, he may not actually enter at all into social relations with them. An intelligent man may be in the midst of an aggregation numbering thousands of human beings and still be no more affected by them than by so many inanimate objects. "You have yourself picked your way through accustomed streets," one student points out, "lost in a brown study, or listened with your fellow men to the music of a great organ utterly without socialization. And, on the other hand, the blushing animadversion to a tactless remark reviewed as you fall asleep makes it evident that one may be highly and violently socialized in complete physical isolation from one's fellows" (*2*, 456).

Animal Associations. Realizing that man is not always socialized even when in physical contact with others, we cannot uncritically say that wherever we find the animal congregated in large numbers, there is social behavior, and so point to such collections as the unquestionable source of social human behavior. Parmelee points out that simply because animals "come together, it does not necessarily follow that it is due to any associative tendency." It may be that external conditions such as temperature or food merely force them together. We owe to Bentley a very clear warning in this connection.

Socialization has often been made a synonym for association or mere propinquity. When we see ants in colonies, bees in swarms, cattle huddled under the shade trees, or men riding to business in a suburban train, we are

prone to assume that they are socialized merely because they are together. That does not follow. The herd, the flock and the swarm are aggregates, but that does not necessarily imply sociality. It does not always imply sociality even when the herd feeds or wanders together or when the ants in the anthill go and come, heap up food and rear young. Sociality must be demonstrated, not assumed. . . . Association and massing may, it is true, be a *condition* of certain forms of sociality; but the two concepts must not be confused (p. 456).

We know that the introduction of a drop of carbon dioxide into the water in which a number of paramoecia are swimming will result eventually in most, if not all, of the creatures becoming collected there. They drive headlong into the region and are unable to escape. Under such conditions there is unquestionably no reason for assuming the existence of social relations. What shall we say, however, of those forms of animal associations in which there is a certain degree of specialization in tasks? Ants, for example, live closely associated in huge colonies numbering hundreds of thousands of individuals. Among these is a well-defined division of labor. But such differences in behavior patterns are based largely upon structural dissimilarities. Certain forms of colonial ants have very large and powerful jaws and to them falls the task of defense; other forms are fertile, and upon them devolves the task" of reproduction; still other types are small, active, and sterile, and to them falls the menial labor of the colony: the gathering of food, the removal of rubbish, the care of the queen and the young.

Perhaps we should point out that differentiation in tasks may be partly attributed to dissimilar *functional* characteristics. Some animals within an aggregation may actually be more efficient than others. The evidence in case of the ant is meager, but some of the higher forms illustrate this point quite well. Mark May, for example, cites the results from an interesting study with groups of fowls, which tend to show, in terms of function, how the particular place of an individual member of a particular group is determined. Referring to the study made by Schjelderup-Ebbe on barnyard hens, he says:

When a flock of hens are placed together in a run, "pecking order" is soon established by fighting. When a newcomer is introduced, her position on the pecking list" is soon established. The "pecking order" may take various patterns. Sometimes it is hierarchic and graded so that the superior hen pecks on all the others; the next in line pecks on all but the one above her, and so on down to the last unfortunate hen who is pecked on from all above and has no one below her on whom she may peck. Other patterns may be triangular, in which A, B, and C peck in the order; A on B, B on C, and then, surprising

as it may seem, C on A. Or again, a quadrilateral order may be observed in which A pecks B, B pecks C, and C pecks D, and D pecks A. Such orders are partially explained by the fact that some hens will submit without fighting. For example, C may submit to D without fighting, but D wins over A. Similar pecking lists are established among roosters, sparrows, and wild ducks (*19*, 747).

Symbiotic Relations. In addition to the association of members of the same species in large aggregations, many kinds of animals—for example, ants—carefully look after certain biological needs of other species of animals. Aphids and mealy bugs are cared for by ants presumably in return for the sweetish fluids which they excrete. Such associations as these between members of different species, which contribute to the mutual advantage of both animal forms concerned is known as symbiosis.

While some individuals profess to see social relations in symbiotic associations, we are forced to question very seriously whether there can be anything social about them. It is quite possible to conceive of the aphid giving up its bodily extracts upon being touched by the ant without involving any hint of the social as we know it in the human being. It does seem rather far fetched to say, for instance, that "touch is used for social stimulation in the stroking of the aphids by the feelers of the ants" (*1*, 155). Shall we say that in the common relations between the cow and the milkman, the cow is socially stimulated by man to release milk? Or, pressing the point a bit further, shall we say that the cow is socialized with the milking machines which are used effectively in large dairies to relieve her of her milk?

Do Fishes and Frogs Show Socialized Behavior? Among the fishes we find several species which congregate in large numbers. A few species come together in pairs at mating time and remain associated until the fry are fairly active. In a great many forms there is no actual association in the reproductive process. The male may contribute the fertilizing agent long after the female has deposited the eggs and departed. The male apparently chances upon the unfertilized eggs and completes the reproductive process. Where the simultaneous presence of both sexes is required for the reproductive processes, we might perhaps say that some degree of social relations, in the widest sense of the term, could exist. But we cannot possibly assume that the behavior of the male fish toward the eggs alone is social without doing violence to the meaning of the term. Finally, we have the many cases where fish move in schools. Such behavior is obviously not to be attributed directly to any sexual relations. Moreover, according to Parmelee, "it does not

involve much mental interaction." The likeliest suggestion is that such behavior is entirely non-social and the resultant of food and temperature conditions which affect alike the many individuals hatching from eggs laid in some particular spot. We know that all the members of a given species of fish in any large region of the ocean do not move together. One school is found here; another school there. The conditions of a particular habitat which cause one fish to move about in a given region also cause many others which emerge approximately at the same time to move about in a similar manner. It is rather unnecessary to invoke social relations in such cases.

Among the amphibians there are temporary associations during the period of mating. A male frog upon coming in contact with a female clasps her tightly with his forelegs. Here is an intimate association, but can we say that it is social? The experimental evidence leads us to doubt as much. We know, for example, that the clasping movements will be made to a dead female or to a piece of her body. They will also be made to a stick, a stone, or another male when bathed in the reproductive fluids of a female. Finally, at times the mere stimulation of the ventral surface of the male with any object will elicit clasping movements. In such cases as the last, it is wholly meaningless to speak of social relations. But the clasping behavior here is not essentially different from that in which a living female is embraced.

Do Birds Form into Social Groups? The birds show both temporary and permanent groupings. Some associations last only during the brief time required for completing the process of fertilization, after which each member of the pair goes its own way. Other groupings apparently endure for much longer times. Among the birds, particularly those kinds which comprise groups of the latter sort, there may be elaborate behavior devices for initiating and sustaining the reproductive cycles. Such behavior, for example, is pronounced among the swans, pigeons, and doves. These elaborate forms of behavior do not necessarily imply socialization. It has been shown that pigeons reared under isolation may exhibit many forms of "courting" behavior toward the hand of the experimenter. They coo, bow and strut. Moreover, when later given an opportunity to associate with other pigeons, they may still exhibit a decided "preference" for the hand of the experimenter. Other and non-sexual groupings, as in migration, appear at times among many forms of birds. Such associations apparently function to the distinct advantage of the species. Whether many of the groupings of this type which we find in flocks of birds are to be attributed to external conditions such as changes in temperature, humidity, or food supplies which tend to

force the individuals together, or to the perpetuation of habits of being together established during the nest life, it is impossible to say. More information is needed about these types of animal groupings before we can safely pass upon their social aspects.

Are Apes Social Creatures? In the lowest mammals the conjugal relations are of the very briefest sort; in the highest of the primates (*Homo*) they may last a lifetime. But a curious fact appears when we consider the associations among the huge apes. Here, because of the close biological affinity with man, we might reasonably expect to find strong evidence of a high degree of sociality. At least we might expect social relations of a fairly extensive sort. But it is only in the gibbon, the lowest form of the anthropoid apes, that we find the clearest evidence of any extensive group life. These creatures rove, hunt, and presumably fight in bands. But the orang is never found in large groups. The male in particular goes his solitary way leaving to the female whatever care the offspring may receive. The gorilla, too, is almost solitary in habit. On the whole, *throughout these higher forms*, there is no true intimation of the type of sociality which we find in man. It is scientifically regrettable that so little is known of the social life of the races of man as represented by such stocks as the Java Ape-man, the Heidelberg Man, the Neanderthal Man, and the like. Finally, we must point out that we know sadly little of the social life of even the Crô-Magnon and the early Neolithic races. Lacking concrete knowledge we turn speculative.

Why Did Man Become Social? Much of man's social life is utterly different from the life of subhuman forms. Even among some of those writers who refer time and again to the social life of the animal there is an apparent inability to find the antecedents of human society in the aggregations or associations of animals. Moreover, nowhere in the animal kingdom do we find a type of grouping that can be considered as representative of a true stage in the growth of family life as found in the human species. Mating we unquestionably find in plenty throughout the animal series; care, too, of a certain sort of the young occurs in various levels of animal life. But the human family, set in the cultural environment of society at large, is unique. We agree with Parmelee when he says:

> It is doubtful if there is any species other than the human species in which permanent relations are maintained between parents and offspring. In all other species the young leave their parents when they are grown, and the recollection of their relationship in all probability soon fades from their memory. Among men, on the contrary, this relationship is usually remembered permanently and has important influence upon social organization (*23*, 401).

Generally speaking, man's social life is to be partly, but indirectly, attributed, we believe, to the same physical characteristics which mark him or set him off as human. Here we indicate a very large brain with infinitely more possibilities for permanent modification than is found in any animal, an erect position, a certain type of free hand for the invention of tools and for gesture, and the ability to speak.

Moreover, his social life is partly, and again indirectly, due, we believe, to his lack of physical strength. Darwin points out in this connection that "we do not know whether man is descended from some small species, like the chimpanzee, or from one as powerful as the gorilla; and, therefore, we cannot say whether man has become larger and stronger, or smaller and weaker, than his ancestors. We should, however, bear in mind that an animal possessing great size, strength, and ferocity, and which, like the gorilla, could defend itself from all enemies, would not perhaps have become social; and this would most effectually have checked the acquirement of the higher mental qualities, such as sympathy and the love of his fellows. Hence it might have been an immense advantage to man to have sprung from some comparatively weak creature" (*8*, 63). It is interesting, indeed, to reflect upon what man's social life might have been had he possessed great physical strength. His life might actually have been like the tiger, the hawk, or the eagle which have little to fear from the other species and which are, according to Parmelee, "very unsocial." In order to survive, man was forced to create weapons and tools with which *to secure food* and *to protect* himself against his subhuman enemies and an inhospitable physical environment.

In addition to the part played by the food desire, we believe that man is social because of his sexual needs and the mating activities which they induce, and because of the prolonged care of the offspring produced. Here, particularly, enter the facts of the lasting effects of habituation. Once the two sexes were brought together for a time long enough to establish strong ties of habits, the problem of continued relations would be largely solved. Understanding and sympathy through mutual give and take would result. Attitudes established through close associations would endure. The individual with his memory and imagination would be inoculated with social references and longings. He would find it more pleasant to be with than away from others.

Finally, we believe that man is social because of the use which he has made of certain psychological abilities which apparently are either lacking in the animal or are of very little use. By means of such abilities as memory, imagination, and understanding, man has been more able

than subhuman forms to profit from the past, to realize the value of co-operation, and to envisage the future results of present activities. In terms, then, of any one of the psychological activities, we might explain a great deal of man's social life. When these are considered together with the other factors which we have mentioned, we have an adequate foundation for human sociality without invoking certain other agents.

Perhaps the best way to give a better understanding of this problem would be to touch briefly upon the nature of the various explanations, involving to a greater or less degree all of the above conditions as well as others, which have been advanced to account for man's social relations; that is, for the fact that man lives in groups and apparently enjoys it.

VARIOUR EXPLANATIONS OF SOCIAL GROUPING

The Intellectual Approach. This is one of the oldest attempts to explain man's social relations. The fundamental thesis of this explanation may be summed up in terms of mutual understanding and mutual agreement to live together. The slogan, if there were one, would be, "You help me, and I'll help you." Social groups, or society at large, in terms of this explanation exist as an invention of man, and because men mutually agreed and consented to live together. This assumes that original man was intelligent; that he was possessed of sufficient understanding and foresight to enable him to realize the advantages to be derived from coöperative, rather than from purely individualistic endeavors; and that he possessed sufficient inhibitory ability to make group life possible. It also assumes the significant part played by language as a vehicle of social communication. Without a language, man could never have made use of his intelligence (if we may think of intelligence as something possible without language) to temper his relations with others.

This explanation obviously neglects such possible factors as biological urges, habituation, and emotions which have been stressed by others. It furthermore denies the operation of any hereditary variation in the more primitive stock by virtue of which early man might have been created as more socially inclined than some of the lower primate forms. It holds that man cannot be regarded as being social by virtue of original nature; he is, if anything, naturally anti-social, solitary, and individualistic. Man became social merely because he wanted to be. But we must agree with Ellwood that "fundamental, biological, and psychological conditions," other than intelligence alone, "must be accepted," and that "these preclude a social life which is merely a matter of consent." Probably no one questions the fact that early man was possessed of

once it has been begotten. There are too many abandoned and mistreated children; there are too many step-parents kinder than blood parents to permit us to believe in any inherited and universal human characteristic to care for one's own offspring.

It may well be that the development of a concept of property or a realization of ownership was necessary before anything approaching true family life was possible. It is recognized that blood relationship, among peoples ignorant of the process played by the male in reproduction, results in the formation of groups around the maternal line. The child is the mother's. But we can see how the development of property rights, together with the realization by the male of clear blood claims, might lead him to stay with the mother and offspring. And in the greatly prolonged infancy of the offspring we would have conditions cementing more firmly the bonds between the sexes, and so preparing the way for further socialization. Thus one writer remarks:

> It is not until we find the production of "child" forms which need prolonged and tender care on the part of one or both parents that the reproductive process gives rise to definite, intimate and prolonged association. It is probably the association of mother and child which started intimate, primary group life. At any rate, out of this relationship sprang the family in the full sense of the term, that is, an indefinite association of parent and offspring. . . . From an evolutionary point of view, the higher forms of group life must be regarded, therefore, as built up by the reproductive process; that is, by the necessities connected with the birth and rearing of offspring needing prolonged and tender care. It is quite as right, therefore, to say that the origin of living in groups is in the reproductive process as to say that it is in the food process or in conflict; and that the social process is a function of the reproductive process as to say that it is a function of the food process or of defense. . . . There is, therefore, much truth in the contention of those writers who have claimed that social life has developed about the child. Child care, at any rate, has been one of the principal interests of human groups from the earliest times. The child has been the center not only of family life, but of the whole social system as well. Safeguarding the child's heredity, birth, and education has been the chief end of much institutional development in human society. While the food process has been the basis for the development of man's economic life, and the defense process the main basis for the development of his political life, the reproductive process has served as the basis for the development of much of man's higher social and moral life. It is the keystone of the arch of social life (*10*, 54).

Food Seeking or Hunger. Everyone recognizes the existence of food desires and the powerful drives which they serve. Some writers maintain that in order to survive, man found it necessary to live in groups to

secure food. It is no doubt true that any grouping tending to favor the control of food supplies possessed a greater chance for survival than groupings lacking such control. If the claims which stress the significance of hunger in the development of group relations be true, it means that man owes much of his *sociality to his stomach!* That is, the stomach initiated the behavior patterns which indirectly involved man in social activities. We have previously referred to Read's theory concerning the rôle of the food impulse in the origin of man. He also offers an interesting explanation of the origin of the social group in terms of the food impulse. He assumes that the early representatives of the human race were essentially solitary by nature; but that an appetite for a flesh diet without adequate individual means of thoroughly satisfying it brought man finally into a hunting pack—a sort of primitive wolf pack —and eventually into more effective social relations. Social habits thus established in the wolf pack endured as the basis for other forms of socialized living. Whether such impulses actually operated in these ways is, of course, unknown. Such explanations are, however, quite intriguing, and they are probably not without an element of truth. It is rather a blow in a way to man's "self-esteem" to realize that he is forced to hang his sociality upon his stomach; or, to consider the problem differently, upon a type of environment which failed to provide enough food of the desired sort. Had there been all the food required by man at hand for the mere taking, he might have remained a solitary creature.

Fear. Other students have found it convenient to refer man's sociality to a form of cowardice. He was afraid to live alone; therefore, he gathered in groups. As an individual, the world was too much for him, but in the group he became courageous. He was not possessed of sufficient physical powers to move out singly, as does the huge gorilla, and fight his way through his environment. He made up for this lack through the adoption of concerted attacks. This view sees man beset on every hand by hostile forces ready to destroy him. His world was anything but a peaceful one. Wherever man looked, there stood an enemy either non-human (physical environment) or human. As a rule, the most destructive were of the former sort. What was actually lacking in the physical environment of a fearful sort, man managed to supply through the operations of his imagination. All of these fearful forces drew men together into groups. On the whole, this is neither a very pretty nor an inspiring picture of early man or of the origin of human relations.

Self-assertion and Submission. Of the many students who have stressed the instinctive basis of social relations one of the most out-

standing is McDougall. While McDougall employs no one instinct to account for all social relations, he appears, to favor the instincts of self-assertion and submission. In terms of the first, an individual upon coming in contact with another seeks to dominate. In case the other individual also desires to have his own way, struggle or conflict arises. The solution of the conflict then appears in the submission of the one and the dominance of the other. Leaders are dominating persons who must have their submissive followers. The human male, too, is said to be dominating; the female to be submissive. This is true, not because the one necessarily wishes to dominate and the other to be submissive, but because the sexes are racially tuned in this manner. Aside from McDougall, however, few psychologists appear to feel it necessary to postulate innate drives of the self-assertive and submissive types. It would seem rather that one may find in the *individual history* of members of society the source of behavior patterns in terms of which they are either self-assertive or submissive. Moreover, the intelligent man is one who usually knows when to be dominant and when to be submissive.

With this brief survey of some of the agencies, *viz.*, habituation, urges, prolonged infancy, environmental conditions, and the use of such abilities as memory, imagination, and understanding, which have been assumed among others to have operated to make man social, let us now consider for a moment a few kinds of social formations.

SOCIAL FORMATIONS

Social life is very complex. It exhibits manifold aspects. One immediately discovers this fact when he sets out to reduce, for purposes of classification, the thousands of situations in which persons come together as social organisms. Among the various types of groups suggested by different writers, we find the following: (1) involuntary and voluntary, (2) institutional and non-institutional, (3) primary and secondary, and (4) congregate and consociate. Let us note certain characteristics of these various classes, which, it should be understood, are not mutually exclusive.

Involuntary and Voluntary. The fortunes of birth introduce an individual into certain human groups, such as the family, the neighborhood, and the community. Since the individual does not choose the particular group into which he is born, such associations are known as involuntary. But the individual, when provided with an opportunity of making a choice, definitely selects certain group associates. He joins a fraternity. He affiliates with a particular political party. He runs

with a certain gang. Or he is accepted in an industrial organization. These, as well as many thousands of other forms of social groups which organize under the recognition of one or several of such factors as age, sex, occupation, school, creed, color, or belief, and to which the individual belongs through his own choice and interest, are known as voluntary groups.

Institutional and Non-institutional. We find that the individual participates either through chance of birth or through choice in the activities of firmly established and socially recognized groups known as institutions. Institutions are habitual ways of living together sanctioned, systematized, and established by communities. Because they are dear to it, the group has seen fit to perpetuate a great many forms of such associations of a political, economic, religious, educational, and artistic nature. Such social organizations embrace the most outstanding or worthwhile values in social life. Institutions are distinctively and uniquely human. They constitute one of the most conspicuous results of social development. They represent perhaps the highest product of man's living together. Because they have proven their worth, man has come to leave to institutions all those major group activities which are found to be beneficial and conducive to his comfort. And because they function satisfactorily in this respect, they tend strongly to endure.

It should be understood that institutions, strictly speaking, are not social forces. They do nothing themselves. "The nation," we are told, "does not will nor the church inspire nor the school educate; neither does labor disturb nor capital oppress. The acts and thoughts are always those of individuals" (*17*, 282). Institutions are descriptive terms referring to what has been done. Similar behavior patterns of many people constitute an institution. Common habits sanctioned by the group are established among the individual members of a group, and the likeness in the activities of the many members is the institution. If all of the members of a group were to be destroyed, the institution would no longer exist. Or if there were no overlapping of the generations of men, it is most likely that no institutions would survive. As it stands, however, the members of the passing generation see to it that certain ways of acting dear to them are adopted by the continuing members of the group. The elder members feel it their duty to mold the junior member. They try to change his perceptions, his memories and imaginations, his desires and his ways of satisfying them, so that they conform to the elders' notion of what is proper. If the one generation is successful in establishing deeply the desired behavior patterns in the other, institutions continue undisturbed throughout generations of men.

As an illustration of the way in which an individual is so molded that he conforms, consider for a moment the matter of wearing clothing.

The habit of clothing is begun at the moment of birth. The first step of parent or nurse is to wrap the infant in swaddling clothes, to conceal his person, and to limit voluntary movements. But it is not the institution nor the concept of clothing that starts the clothes-wearing habit. Nor is it the custom nor the law that first compels one to dress. It is the individual parent or nurse. But by maturity clothes habits are established, the body has become adapted so that clothes are required for personal comfort, clothes are used as the chief mode of personal ornament, and ideas and emotions have so developed about the exposure of anatomy that in spite of adolescent radicalism, clothes continue to be worn. The radicalism expresses itself weakly in trivial innovations of style, length, color, and fabric. Few adolescents and fewer adults question the institution of clothing itself.

Minor choices the individual is allowed. Current innovations and fads he is permitted to initiate. But all such liberties are within limits. The woman may wear shoes, or slippers, or sandals, but her feet must be shod. She may wear silk or gingham, wool or fur. Her garments may be elongated, abbreviated, opaque, transparent, abundant or scant, but garments they must be. In the heat of the kitchen, in midsummer, in the stupor of sleep, even when dead and buried, the human form must be draped.

The custom of clothing is thus found. It is itself a product, not a force; it is a descriptive generalization. Adults resemble each other in wearing clothing; this fact of resemblance we call custom. But clothing must be worn before the custom exists. The custom is not an agency; the agencies are personal, the personal acts of individual nurses and parents, the personal habits of the clothed persons. Each individual wears clothes because of his own personal history, just as he digests in his own stomach. People do not first imitate each other, and therefore wear clothes, any more than they imitate each other because their sleep or their digestions are similar. Custom no more produced clothing than it does sleep or digestion. Custom is the retrospective or historical fact that individual habits are similar (*17*, 284).

Although there is a very strong tendency to institutionalize all the more important groups and relations in human society, there remain a fairly large number of non-institutionalized relations. As one meets friends and acquaintances, group after group of a very highly transitory nature is formed. In the class room, at the community store, in the fraternity, on the athletic field, in the dining room, groups of this sort constantly form and reform. Group relations of this fluid sort are particularly instructive to the social psychologist since he feels that he comes closer in these to the individual's social nature than he does in the fixed relations represented by the institution.

Primary and Secondary. In the primary group we have given those many relations in which men are brought together, face-to-face or in physical proximity. Probably the most primitive of such was the mating pair. The most universal type is found in the family group. Wherever persons interested in each other get together, a primary group is created. "For thousands of generations," we learn, "men knew no other form of association than these face-to-face groups." The primary group was the earliest form of social association; it is today the most common.

Group relations of this sort exercise a tremendous influence upon the individual. It is impossible to conceive of man's ever becoming socialized without the aid of the primary group. Meeting face to face with his fellows he learned his lessons in coöperation; he developed sympathy, loyalty, and mutual understanding. Moreover, to the primary group goes the task of initiating the individual into a social life; of preserving, in the form of enduring changes in the psychological functions of the young, the sort of behavior that is expected of him by the group and which, considered collectively and historically, is known as tradition and custom. The child grows up in the primary group. He absorbs his social training along with his language and his purely personal habits. The values, the traditions, the beliefs, and the attitudes of parents, elder associates, and companions of his backyard, the street, and the playground become his values, his traditions, his beliefs, and his attitudes. As one writer puts it, "So much does the child get his values from these groups that there are not wanting educators who claim that social and moral education can never be given adequately in our public schools." The members of the primary group, then, are the outstanding carriers of customs, taboos, superstitions, morals, ethics, and the like. Suggestion is more powerful where face-to-face relations prevail; behavior is more amenable to control and modification. A stronger appeal is made to the emotional side of the individual. Enduring habits and attitudes of a social sort are thus established.

Finally, the primary group creates social standards and ideals of behavior. "The ideals of love, service, self-sacrifice, and human brotherhood, for example, originated in the experiences of family life. The ideals of freedom, justice, and good citizenship originated largely in the experiences of neighborhood life; while the ideal of fair play manifestly came from the play group. These idealistic social attitudes have their source in the experiences of primary group life" (*10*, 124). These determine to a great extent the culture of the generations. Thus the primary group stands as one of the most efficient mediums of trans-

mitting group culture. It stands even above such institutions as the school or the church.

The secondary grouping differs from the primary in that the individual members are not in physical proximity. In them we lack the "intimate, direct, personal" relations of the primary group. Here fall the various religious sects, the political parties, the economic groups, and the state and national associations. These, too, have a profound effect upon the individual. Directly and indirectly, they help to determine the social make-up.

The state has set up standards of loyalty, of law-abidingness, of obedience, and of service which have had the greatest influence upon the behavior of civilized men. The autocratic state, especially, insisted upon all of its members following these standards of conduct in their relations with the governing class of the state. The modern democratic state has not found it possible to dispense with these standards, as they are the obvious supports of every sort of political organization (*10*, 134).

Congregate and Consociate. Here we find individuals in physical proximity as in the congregate, or physically separated as in the consociate. The congregate corresponds rather closely to the primary and the consociate to the secondary groups just discussed. Of the general character of these two forms, Bentley writes:

The generalized social meaning of the congregate to the individual member is "we," or "we are together," or "we are members." On the other hand, the consociate implies, as a rule, the physical isolation of the individual, who is, nevertheless, invested with social meanings. When one suddenly sees one's name in the daily prints one enters the consociate. The generalized social meaning here is "I belong." It is a mistake, of course, to say that we are socialized only when we are in the mass. No one who has lived through a period of patriotic or religious fervor will fail to apprehend the variety of vivid experiences in solitude which make reference to the fact that he "belongs." This consociate form of meaning arises much oftener than we are likely to suppose. The fact that mere propinquity or mere isolation is only conducive or incidental to sociality and is not sociality itself is shown (1) by non-sociality in the group, as when one becomes absorbed in a computation while walking upon the crowded street; (2) by the consociate moment of "belonging" which flashes into existence as one enters the door of one's club or church; and finally (3) by the vivid memory, as at a wakeful moment in the night, which places one again at a festive dance or in the theater. Even the direct apprehension of another individual, "impersonally regarded" as we say, may, on occasion, be devoid of social implications and meanings. It is possible, therefore, to divest oneself of sociality in the mass, to consociated there, or finally to realize the congregate form of social meaning when the individual

is "present" with others only in memory or imagination. Nevertheless, the congregates, which mean "we are members," *usually* appear where men are physically congregated, and the consociate meaning "I belong" *usually* arises when one regards oneself in isolation as sustaining a generic relation to one's fellows (*2*, 469).

Under the congregate we find such groups as the audience, the reception, the jury, the throng, and the riotous mob. Here the chief psychological functions employed are perception, action, emotion, and understanding. We see, hear, feel the other members gathered about, and our whole psychological make-up responds to them. We believe and behave in the light of the behavior of those around us. We turn now for a brief glance at the psychological characteristics of some of these congregates.

The Crowd. Groups of this class show varying degrees of sociality. The simplest degree is represented by the chance aggregation of individuals upon the street, at the market place, in the parks, and the like. In such chance groupings we find essentially nothing in common among the members. There are no mutually perceived objects, no remembered events to be talked over, no task to be accomplished cooperatively, and no emotions to be shared. In a moment, however, such aggregations may be more or less closely knitted together by some commonly regarded object or event, such as a newly wedded couple getting into their car, a window washer at his work, or an accident upon the street. Clark gives the following description of one form of a crowd:

A number of individuals watching a Fourth-of-July celebration constitute the kind of crowd which we have called an aggregate. A certain part of their environment, the fireworks, influences all members. Although the individuals may differ greatly in other respects, they all possess the disposition to attend to, and to be pleased by, brightly colored lights in rapid movement. To each person the display is a social event, although the attribute of socialness may be manifested in different ways. Some may simply apprehend the presence of others. Some may be conscious of their companions' exclamations of delight. Still others may not only experience pleasure themselves, but may infer that the consciousness of their fellows is like their own. Finally, there may be appreciation and sympathy of one member for another. When others act as we act, and toward the same objects, we usually feel that they sympathize with us and approve of our conduct. If these conditions are fulfilled, the crowd continues to exist for a time, and its crowdish characteristics are intensified. As for the dissolution of such a group, we may allege several possible reasons. If the influence of one environmental factor is intense and of long duration, adaptation and shifts of attention occur, and the crowd breaks

up. If an appeal is suddenly made to another common organic disposition of the members, the crowd rapidly disintegrates and another crowd of a different character is formed. This occurs, for example, when a dog runs across the rostrum during an interesting lecture. The organization may also be destroyed when strong appeals are made to tendencies not common to all members. Finally, if the object or event loses its social character for a given individual, that individual ceases to be a member of the crowd. If a party is being conducted through an art gallery, one of its members may become so absorbed in the contemplation of a picture that he is oblivious to the presence of others and no longer thinks of the object as in any way social (*7*, 31).

Scott suggests further characteristics of the crowd.

The crowd is like primitive man in its thinking and acting. Reason does not enter in to restrain action, to criticize suggested ideas or to hinder self-surrender to absorbing emotions. It may be truly said that a crowd never reasons and that it is never critical. A crowd composed of intelligent citizens will accept as truth the most absurd utterances and applaud proposed plans which individually each man might scorn in derision. As individuals we inhibit more actions than we perform. A feeling of responsibility and propriety restrains us in a way that is absent to our primitive ancestors as well as to the crowd. Whatever is done by other members of the crowd is proper; also, because of the many involved, the feeling of responsibility is removed for each member. The crowd, being relieved from the restraints of property, responsibility, and critical thinking, is in a condition to act upon every suggestion in an impulsive manner such as is impossible to the individual when acting alone. Under such conditions, instinctive and impulsive actions and imitation play the leading part, as they do with primitive mankind. There is an alacrity of response, an immediate carrying out of every suggested action, which is wholly absorbed in the crowd purpose and is completely devoted to that purpose, whether it be the lynching of a negro, the adoration of a hero, the winning of the game, or the capture of the holy sepulchre (*25*, 175).

Characteristics of an Audience. A great deal has been written about the audience. One of the ablest discussions is given by Woolbert. Among the characteristics of the audience, which he points out, are the following: (1) the audience is receptive and amiable, expectant and tolerant. The various members are present to listen, to enjoy, to learn, and to be inspired; (2) furthermore, there is homogeneity of *interests*. Thus certain groups "give allegiance to specific customs, taboos, rituals, ceremonies, traditions, and beliefs. All of these social factors rest on similarity of function and likeness of tradition"; and, finally, (3) there is a definite set which serves to incline the psychological functions of the members of an audience in a particular direction. The audience, we say, is a primed group.

When we know that we are to listen to a political speech, our set differs from the set under which we hear a university lecturer discoursing on political science; and the difference is still greater between the tuning for a political meeting and for a religious service, for a gathering of farmers and the convocation of a collegiate faculty. Once we are prepared for a given occasion, we are easily integrated, provided only the occasion yields what we expect (*30*, 41).

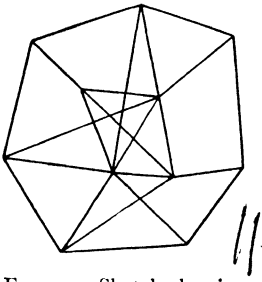


FIG. 29. Sketch showing All-to-All relations in an audience. From Woolbert.

In this form of the congregate the individual obviously draws heavily upon perception. But the object perceived is not so much another member of the group beside one; it is rather the speaker. This relationship between the auditor and the speaker in the audience is known as polarization. It is another essential characteristic of this social group. The group is composed of the two poles. The speaker occupies the one, while the auditors occupy the other pole.

Types of Relations in the Audience. While the audience awaits the speaker, the psychological relations among the members may be shown by such a diagram as Figure 29. Here the relation is an all-to-all one. With the speaker in place the degree of polarization is repre-

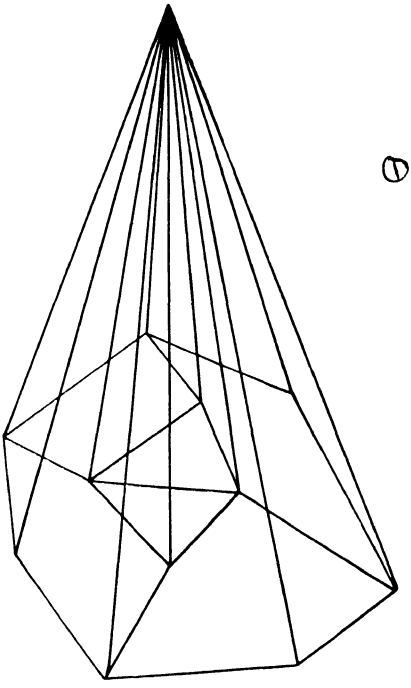


FIG. 30. Diagram of All-to-All and All-to-One relations in an audience. From Woolbert.

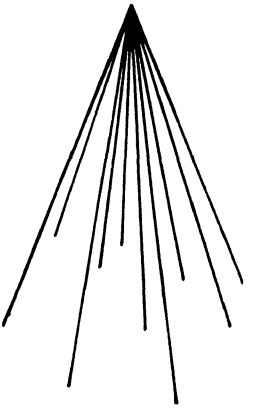


FIG. 31. Showing One-to-One relations in an audience. From Woolbert.

sented by Figure 30. Here the relation is an all-to-one as well as all-to-all. The various members perceive the speaker, a fact which we represent by lines leading to one point; but they also perceive each other. As the members become more attentive to the speaker, the all-to-all relations drop completely away, leaving a series of one-to-one relations, as shown in Figure 31. Woolbert points out:

> The inhibitions are gone; attention is at high focus on the speaker and on what he is saying. The speaker has entered in reality into a one-to-one relation with the individuals before him. According to his skill in holding them is his power to prevent the inhibitions from coming back. If he loses his grip, the audience reverts to a state indicated in Figure 30. An inapt remark will bring about this result, or monotony of utterance, or a sudden interruption,—anything, in fact, which distracts attention from the speaker's thought. Where the speaker is effective, he dominates the mental functions, leading his auditors into new paths of thought, stirring in them a variety of feelings, and arousing, at will, emotional and volitional impulses. But where the occasion and the speech are of such a nature as to enable the audience to retain its social armor, social inhibitions will play their part in action. Church meetings, gatherings on academic occasions, lectures before the community's "best people," seldom call for outbursts which shock the sensibilities. On such occasions the crust usually holds. But an appropriate speech delivered to an audience not so effectively armored, causes the shell to give way to the concealed impulses. On such occasions it is, that conduct becomes crowdish and that the mob rules. Social conventions are forgotten. The fear of social ostracism or taboo is removed. Men in such a condition are not concerned whether or not they are social conformists. The idea of being a pariah has no fear for them; for social consequences do not enter into their thinking. Men who are reserved under social inhibitions may be made to reveal an inherent coarseness when these social inhibitions are removed. Women who conceal their emotions when they realize that others are looking on, break into hysterical weeping or rage once they forget that they are the observed of observers. The man who says in his own mind—where no one else can hear him—that the object of the mob's hatred ought to be "strung up," is just the man to take hold of the rope when he is made oblivious to social consequences (*30*, 46).

Consociate Relations. As we have seen in this general class of social grouping, the individual holds membership largely by way of memory and imagination. There is no physical proximity or face-to-faceness as in the congregate. These groups are secondary in the sense that they genetically follow the congregate. In a way, we might say, this group involves a "higher" degree of socialization than does the congregate, because adherence to group standards is much less difficult when one is physically near those of his kind who exercise watchful care upon social behavior. When one is entirely isolated, however,

from other members of the group, and when one knows that no censorious eye or restraining hand is upon him, greater determination involving a higher degree of self-control appears to be demanded in order that the individual may be properly sustained. In completing our discussion of this phase of socialization let us turn again to Bentley.

On the side of function the "I-belong" reference serves at once as a refuge against isolation and as a gentle and mild censor inhibiting overt acts against the state and the community; but the passionate acknowledgment of identity with a race or a cause creates a principle of conduct which sets purposes, commands action, and determines the destiny of the member and of his group. Intermediate grades of the assemblage[1] need only be suggested. Many of them fall under our conception of civic and private duty. They represent a large number of ways in which the individual regards himself as related to his kind. They serve in large measure to maintain parties and states, clubs, churches, and philanthropies. The occasional meeting in the congregate strengthens them and increases their integration; but they exist as unique organizations with properties and functions of their own (3, 24).

Two tasks yet remain before we may contentedly close our discussion of the psychology of the group. The one task has to do with the problem of social control; the other with the problem of the failures in socialization.

SOCIAL CONTROL

Harmonious living together implies control just as harmonious life in a biological sense implies control. One cannot be wholly individualistic and yet enjoy membership in a group. Social life demands that the individual order his behavior in the light of the standards of his particular group. Now man, we believe, is neither innately selfish nor innately social. In the beginning he is quite neutral. Because of the great acquisitive powers of his brain, he possesses many possibilities for developing behavior patterns either of a desirable or of an undesirable social character. Thus the task of social control becomes in a great many cases mainly directive. This is particularly true of the growing individual. Such control is largely concerned with the operation of selected agencies, the primary function of which is to bring the individual up along socially desirable lines. He must be made to be loyal, but not loyal in a socially undesirable way. He must be made to be coöperative, but not coöperative in destroying all that is socially desirable.[2] But individuals exhibit behavior of an undesirable sort. Social control, in

[1] Assemblage as used here may be taken to mean the same as consociate.

[2] Perhaps we should point out that no justification for social control exists aside from the fact that group action and coöperation are absolutely essential to the promotion of many types of human endeavor.

such cases, cannot remain merely *directive*; it must also be *restrictive*. It must thus serve not only to cultivate some forms of behavior, but it must also act to stamp out other forms. There are, then, two very important phases to social control.

Human societies from the first present more or less of the phenomena of authority and of social discipline. If the individual varies too greatly from the standards of his group, if he refuses to coördinate his activities in harmonious ways with the members of his group, he is punished. From childhood to the grave the individual is surrounded by stimuli of all sorts, chiefly in the way of possible rewards and penalties, to get him to coördinate his activities harmoniously with those of his group. This is what we may call "social pressure" (*10*, 157).

Control Is Always by Individuals. We must bear in mind that social control is always of the individual, by other individuals, and for still other individuals in the group. But we recognize that the mechanism of control is intrinsic to the individual who is to be controlled. Religion, for example, appeals to certain desires of particular individuals. People wish to do right in order that they may achieve happiness. Or public opinion works because individuals are not callous and indifferent to what they believe others are thinking. They may wish to further their own interests, which may be impossible if public opinion is against them. Finally, law and order function to determine social behavior because individuals wish to take their exercise outside rather than inside the high walls of penal institutions.

Social control may be exercised by any one of the social groups which we have discussed. We have here referred to the importance of the group upon the individual. Let us briefly consider here the means by which two forms of group life,—*viz.*, institutionalized and the non-institutionalized—control the behavior of the individual members. Among the former we wish to refer briefly to the operation of government, law, and religion. Among the latter we shall speak only of public opinion and custom.

Control through Government and Law. These are the institutions of social control to which we hopefully look when all others fail. They operate largely because of the tendency on the part of most individuals to avoid pain, discomfort, and restriction of liberty. These institutions depend mainly for their effectiveness upon the fear of punishment. The individual as a child may be taught to fear the law represented usually by the big policeman around the corner. This fear enduring through the years affects behavior. Where fear of such agencies is lacking, where there is only contempt or indifference, we have the con-

ditions for great or ignoble behavior. When governments grow despotic, great heroes arise; where the law is justly enforced, criminals occur. Where the law is obviously unjust, institutional deterioration may rapidly ensue. The social fabric of man's life under such conditions may become too greatly weakened to endure. One of the most important problems of society concerns the proper means of increasing the effectiveness of government and law as regulative devices.

This problem is far from solved even in countries the most advanced politically. The best of modern governments can scarcely be said to be adapted to the work of securing a high degree of social order, welfare, and justice among the conflicting elements of our complex industrial communities. The New World especially has lost, in part, its tradition of the place and importance of government and law in the social life; and we sometimes say that its trend has been toward lawlessness. The nations of Europe, on the other hand, may seem in some cases to have exaggerated the importance of government and law; but their governments have often been autocratic, and are far from efficient as organs of social justice, to say nothing of social progress (*10*, 398).

Government and law are largely concerned with control of overt behavior. They are frequently ineffective for there are fundamental motives and attitudes to which such institutions cannot easily appeal. Such institutions as a rule enter the individual's life too late to affect it in the deepest and most effective manner. So long as the appeal is chiefly to fear of bodily pain and suffering, or deprivation of freedom, many powerful motives in human conduct remain largely untouched. We must look, then, even as do the institutions of government and law to the operation of other social influences or agents of control. Of such, no one is perhaps more important than religion.

Religion. There are so many diverse forms of beliefs and practices which pass as religious that it is an extremely difficult task to define religion. We shall therefore take for granted that every individual knows what is generally meant by religion. As we briefly refer to the various ways in which religions operate as a form of social control, we shall bring out certain of the more fundamental characteristics of religion. Religion, like the two social institutions just discussed, may appeal strongly to the individual by way of *fear* and so result in the production of socially desirable behavior. The threat of eternal suffering, of excommunication involving a withholding of all rights of marriage and burial, or the denial of eternal happiness with loved ones may operate to order the behavior of the individual along proper lines. But religion may appeal to the *love* of God and one's fellowmen and so profoundly affect man's behavior toward others. Religion regarded in

this way unquestionably tempers man's actions and emotions. He becomes more kindly, more sympathetic, more charitable toward those of his group. He develops a loyalty of which no firmer sort may be found. That men have suffered indescribable agony in the torture chamber, among the lions, and upon the cross through religious persecution attests to the type of loyalty which religion is capable of inspiring. That men have butchered untold thousands of others including helpless women and children shows how far religion may go in creating a group to which some do and some do not belong. Socially regarded, the most desirable form of religion is perhaps that which sanctions attitudes, values, and high ideals which are common to the minds of all men. Through such an agency, man could come eventually to enjoy membership in a world-wide group. Perhaps that sort of religion will be the coming one; for it seems that contemporary religions are actually beginning to exhibit unmistakable signs of decline. We mean by such decline no more than a lessening of the former effectiveness of religion in men's every-day lives. When we realize so clearly the great efficacy of religion as a means of social control, it is indeed disturbing to contemplate such signs of religious decline. If the place of religion in our present achievements were being taken by a life intelligently ordered and controlled, there would be somewhat less cause for alarm. But for such a loss, we find at the moment no satisfactory recompense. There is certainly, as yet, no worthwhile substitute for religion as an agency of social control.

Religion, then, appeals strongly to fear, love, and reverence, and so affects behavior in a social way. It also offers a way out of troubles and cares. The heavily laden may lay down their burdens; the oppressed, the weak, and the forgotten may find in religion a way out; for through it they are granted intimate relations with One with whom their burdens are shared.

With this brief discussion of some institutionalized forms of social control we turn to the non-institutionalized sort.

Non-institutionalized Agencies. Here we have to deal with those forms of group relations which have not been so thoroughly sanctioned and firmly established by society at large. We refer more particularly to such as the "community," the crowd, the gang, the clique, the recreational group, in short all those relations which are more or less impermanent and shifting. The individual members of these groups serve, as we have said, as powerful agents of socialization. They do not operate upon the individual so much through fear of physical restraint or severe bodily punishment as do government and law. Nor do they function through reverence, love, and awe as in the case of religion. They control

behavior through ways best described as public opinion, customs, rules and unwritten regulations, convention, taboo, fads, fashions. We wish to speak here only of public opinion and custom.

Public Opinion. For most persons this form of social control is all powerful. There are very few individuals who are so indifferently minded, or so well established, that they can bear to disregard it. Especially do those persons who occupy public office or wish to occupy posts of community trust understand the tremendous influence of public opinion. Just as keenly, however, do those who have transgressed the unwritten codes of the group realize the effects of public opinion. By public opinion we do not mean anything mysterious or magical. We mean by it nothing more than that an individual believes or is convinced that many persons of his group have a like opinion or belief about a certain matter. A man might be quite sure that public opinion is against him and behave accordingly; while, in fact, the many individuals, each of whom would have to hold a particular view in order for the individual's belief concerning public opinion to be true, may either hold quite the opposite view or be utterly indifferent. Public opinion is simply a psychological attitude common to many members of a group. Its source is to be found in the imagination and understanding of individuals. In its scope, interestingly enough, it more often than not has fairly definite geographic boundaries. For example, public opinion about the Negro in the South, the Mexican in the Southwest, or the Oriental on the West Coast has fairly definite geographic restrictions. Individuals living in more remote parts of the country are relatively unaffected by what the people of these regions think about these problems.

Public opinion, or common ways of thinking about certain topics concerning other members of the group, may be modified in many ways. The commonest form is known as propaganda. Propaganda is the deliberate, one-sided presentation of some cause, movement, or plan in order to establish a favorable or unfavorable frame of mind. As Dodge expresses it, it is "the art of making up the other fellow's mind for him, of gaining adherence to principles, support for an opinion or course of action." While it may appeal to the intellect, it usually looks to the emotions for support. It may take many "visible" forms; *e.g.*, newspaper, books, radio, pamphlets, motion pictures, lectures, private talks by one individual to another. In fact, wherever one member of a group may affect another, we have possible conditions for propaganda. During the World War very effective use was made of it to secure enlistment, to sell bonds, to conserve food supplies, to keep up morale and courage. The enemy was pictured as being everything that was vile and un-

speakably vicious. There was only one course to follow: he must be exterminated. But as a matter of fact, sober judgment has shown that the individual soldiers composing the armies of the enemy were ordinary every-day men surprisingly like the men of our own armies. They were neither unduly vicious nor deserving of complete destruction. But propaganda served to cause many to believe what the leaders of the group wanted them to believe.

Custom. We have already referred to the nature of custom. We point out here that custom is a most effective agent in securing proper group behavior. Custom, we say, works because an individual is brought up along certain lines by establishing quite early in his life the type of behavior patterns which society sanctions. In the primary or congregate group where he is faced by others who are older, the conditions of education, we say, prevail. He learns that there are certain things to be done in such situations as the birth, the graduation, the marriage, or the burial of others. There are certain times of the year when he must send greetings, give presents, call upon others, and so on. The members of the family, the friends of the neighborhood, the authoritative heads of the community see to it that he does these things. He is very early inoculated with the idea that whatever certain other members of the group do is proper. In other words, he is taught submissiveness and conformity. Prestige, inertia, and perhaps at most times a lurking fear of the new hold him to the traditional ways of the group. The usual way is the best. We know how quickly such terms as "crude," "uncultured," "smart guy," arise when a person known to be a member of a group fails to conform. It is distinctly shocking to some to see another take his place at the dinner table without removing his hat. Or the food may not taste quite right if the customary blessing is left unsaid. It is this clear distress experienced under violation of standards to which one has been accustomed that causes so many to be so deeply affected by any suggested change. If one were to verbalize the matter, it would probably run this way: "Where I come from they do it this way," or "I don't like to see it done in that way. It has always been done the other way. I should like to see it continue to be done that way." Established behavior patterns which constitute customs, operate in the individual to produce pleasure or, when disturbed, displeasure. In the same way such personal patterns as smoking, taking a plunge in the morning, eating bacon each day for breakfast operate to produce pleasure or, when disturbed, displeasure.

FAILURES IN SOCIALIZATION

Social Conflict. The vast majority of troubles of a social nature may be attributed to some form of conflict. One group may conflict with another group and thus occasion war. Large numbers of individuals may coöperate to destroy by force some institution or institutions. Here we have revolution. Finally, the individual may come into conflict with some institution or social group. We recognize that an individual may suffer conflict, which may be peculiarly personal. One may desire to spend his money for a good time but at the same time realize that he must save if he is to be well-clad, properly nourished, and warmly housed in his old days. He may desire very strongly to satisfy his desires for sexual relations but control himself in the face of many dangers. He may be desirous of making more money but realize keenly that he is forever handicapped. All these as well as thousands of others which we could describe contribute to a state of uncertainty, unrest, dissatisfaction. We shall have occasion a little later to refer to such conflicts. These may or may not be social. We wish now to consider only those which are clearly social; that is, where the individual comes into relations with others of the group.

It is evident that conflict of this sort may be due to a number of factors. Speaking generally, we say, it may be attributed at times to a breakdown in the functions of the group upon which the socialization of the individual depends; to abnormal, hereditary conditions on the part of the individual; or to undesirable agencies such as bad laws, corrupt governments, inadequate religions, and the like. An individual, then, because of his history, either racial or individual, or because of some faulty institution may behave in a way which is contrary to certain social standards.

The earliest conflicts appear as resistance to parental and familial restraints. The individual may seek to satisfy his desires in ways prejudicial or contrary to the interests and standards of the family group. There are very few individuals reaching maturity who have had such fortunate care that they have not suffered such familial conflicts. The nature of the solution which such immature individuals discover serves, it seems, to determine very often the way in which the individual reacts to other social groups when he assumes his place in the world at large.

Bad Homes and Improper Training. It is, then, to the early home life that a great many of the undesirable behavior patterns in the adult are to be attributed. Probably a great deal of the criminality of the adult might be traced to a delinquent childhood. The following data

show factors of a social nature responsible for the undesirable behavior patterns of 163 children between the third and ninth years in the Philadelphia schools and 167 children from the same grades in the Los Angeles schools (*4*). Here the major contributory conditions to undesirable behavior are poor training and disciplining, lack of proper recreational outlets, broken homes, and bad companions. In most cases no single factor may be cited to the exclusion of others. A number of situations enter in the determination of the final product. Improper training in the form of over-indulgence or over-protection may alone result in unfitting the child to meet the sterner conditions of social life. The individual is lacking, we say, in initiative or self-reliance. Or he has developed habits of non-coöperation, which result in his finding it difficult to give and take in the outside world. On the other hand, extreme parental severity may result in the development of such traits as excessive timidity and cowardice, lying to escape punishment, or a hard rebellious attitude toward the world. The pliant boy or girl may thus be turned definitely into undesirable channels.

Broken homes apparently tend to create an unwholesome social atmosphere for the individual. At least a disproportionate number of delinquent individuals come from such homes. Slawson remarks:

Social Conditions	Philadelphia Cases		Los Angeles Cases	
	Number	Per Cent	Number	Per Cent
Poor training and discipline	151	92.7	146	87.5
Recreation, lacking or improper	112	68.7	54	32.4
Broken home	78	47.9	49	29.3
Undesirable companions	63	38.7	46	27.5
Poverty	62	38.0	19	11.8
Disharmony in parental relations	22	13.5	21	12.6
Foreign home	21	12.9	7	4.2
Institutional life	13	7.9	...	....
Foster home	11	6.7	10	6.0
Illegitimacy	6	3.6	...	....
Overwork	2	1.2	4	2.4

The association which we found to subsist between abnormal marital relation of parents and male juvenile delinquency is a fact which deserves serious consideration in any program of delinquency prevention. The fact that a boy coming from a disintegrated home is much more apt to become delinquent than one who comes from a home of normal parental relations implies that the amelioration of the deleterious consequences resultant upon the breaking up of the organization of the home is an effective step toward delinquency prevention (*27*, 446).

Burt, in a study of delinquency among the younger generation in

England, found that sixty per cent of his cases came from broken homes. Of all studies of this nature those made by Healy and Bronner are most extensive. In an investigation made upon 4,000 delinquents in Chicago and Boston, it was found that 72.5% were to be attributed to a failure in the process of socialization. Of the various social causes around 50% came from broken homes. Less than 8% of the delinquents found came from what could be considered as a good home environment "in the sense of discipline and parental relationship."

Hereditary Defects. But the family and other social groups may be quite without fault, yet conflict results. There are hereditary defects which are conducive to conflict. Persons, for example, who possess very little emotional control may be easily precipitated into social conflicts. They may be of normal intelligence but lacking in emotional inhibition. There is always a certain percentage of such individuals who contribute to society's ills. Concerning this point, we find Slawson writing:

> The demonstrated intimate association between psychoneurotic responses and male juvenile delinquency is an indication of the relative preponderance of the emotionally unstable among the delinquent boys. The abnormal responses given are symptomatic of abnormal affective patterns. Although it is impossible to state to what extent these patterns are of innate or acquired origin, there is little doubt that many of the reported complaints could have been averted, and the establishment of emotional and intellectual complexes prevented by the recognition and treatment of such abnormal trends in their incipiency (*27*, 144).

Other individuals who conflict with the group are clearly lacking in intellectual ability. They represent individuals who are innately short-minded. From a study of 1,000 juvenile "repeaters," Healy found around 17.8% who were subnormal. Of the 4,000 offenders to which we referred above, approximately 13.5% were mentally deficient. As a final word on this topic we wish to offer the opinion of another student.

> Although the importance of the factor, intelligence, as a contributory factor to delinquency has been exaggerated by many workers, chiefly because of their failure to consider intelligence in the light of social status and parentage, it, nevertheless, is a potent factor. Our results point, however, to the fact that it is in verbal abstract intelligence that the deficiency of the delinquent boy is mostly manifested, and that in non-verbal concrete intelligence the inferiority is less marked. In mechanical aptitude, the delinquent boys tend to be on a par with non-delinquent boys.
>
> The presence of an association between general intelligence deficiency and male juvenile delinquency, even when social status is taken into account,

indicates the necessity for supervising the training of intelligence deficients at an early age. It is without doubt that delinquent tendencies among intelligence deficients can be curbed to a large extent by specialized instruction of deficient pupils in the public schools, which should be concerned chiefly with vocational and moral training. In addition, there must be social supervision of the home and extra-school activities of the deficient subjects, post-school guidance, and attempts at the simplification of the environment by encouraging placements in suburban and rural districts (*27*, 442).

Faulty Institutions. Finally, we may say that not all conflicts of a social nature are to be attributed either to a breakdown in the agencies in charge of the individual's socialization or to mental deficiencies on the part of the individual. Some of them are due to faulty institutions. If a law is obviously unjust, or if laws clearly favor certain individuals, if religious standards are too narrow or antiquated, or if educational institutions have become obviously inefficient, the individual seeking to produce improvements may come into conflict with the group. Some of the greatest persons of the ages have strongly stood in conflict with faulty institutions. It is to conflict of this latter sort that we owe much of the social progress of the past.

BIBLIOGRAPHY

1. Allport, F., *Social Psychology.* 1924.
2. Bentley, M., *The Field of Psychology.* 1925.
3. ————, "Studies in General and Social Psychology from the University of Illinois (ed. by M. Bentley)," *Psychol. Mo.*, 1916, *21*, No. 92.
4. Blanchard, P., *The Child and Society.* 1928.
5. Burt, C., *The Young Delinquent.* 1925.
6. Cason, H., "Gregariousness Considered as a Common Habit," *J. of Abnor. and Soc. Psychol.*, 1924, *19*, 96.
7. Clark, H., "Studies in Social and General Psychology from the University of Illinois (ed. by M. Bentley)," *Psychol. Mo.*, 1916, *21*, No. 92.
8. Darwin, C., *Descent of Man.* 1890.
9. Dunlap, K., *Social Psychology.* 1925.
10. Ellwood, C., *The Psychology of Human Society.* 1925.
11. ————, *An Introduction to Social Psychology.* 1917.
12. Ewer, B., *Social Psychology.* 1929.
13. Gault, R., *Social Psychology.* 1923.
14. Healy, W., *The Individual Delinquent.* 1920.
15. ————, *Mental Conflict and Misconduct.* 1923.
16. ————, and Bronner, M., *Delinquents and Criminals.* 1926.
17. Hollingworth, H., *Mental Growth and Decline.* 1927.
18. Kirkpatrick, E., *The Individual in the Making.* 1911.
19. May, M., *The Adult in the Community* (Foundations of Experimental Psychol.). 1929.
20. McDougall, W., *An Introduction to Social Psychology.* 1920.
21. ————, *Psychology, the Study of Behavior.* 1922.

22. Ross, E., *Social Psychology.* 1915.
23. Parmelee, M., *The Science of Human Behavior.* 1913.
24. Ross, E., *Social Control.* 1906.
25. Scott, W., *Psychology of Public Speaking.* 1907.
26. Shephard, W., "Public Opinion," *Amer. J. of Sociol.* 1909, *15*, 32.
27. Slawson, J., *The Delinquent Boy.* 1926.
28. Strong, E., "The Control of Propaganda as a Psychological Problem," *Sci. Mo.*, 1922, *14*, 234.
29. Thomas, W. I., "Race Psychology," *Amer. J. of Sociol.* 1912, *17*, 725.
30. Woolbert, C., "Studies in Social and General Psychology from the University of Illinois (ed. by M. Bentley)," *Psychol. Mo.*, 1916, *21*, No. 92.

PART III

Differential and Applied Psychology

CHAPTER IX

DIFFERENTIAL PSYCHOLOGY

The Nature of Individual Differences. Physically and mentally regarded, some individuals are born long, and others are born short. Some are provided with nervous mechanisms which permit of high achievement. Others are destined from the very beginning to be drooling idiots. While human beings show great physical dissimilarities, they differ most widely in psychological traits. Sensory abilities, for example, show large variations among individuals. Some people are deaf, while others have very keen hearing. Memory and imagination likewise are very unequally distributed. Some men are richly endowed with these capacities, while others are clearly marked by their absence. Human beings are also very dissimilar in terms of emotional make-up and emotional control. Some are stolid and indifferent; others are emotionally alive. Some exercise great inhibitory control over their behavior; others break down very quickly under slight provocation. Finally, we know that while some individuals appear to be blessed with great powers of understanding and thinking, others seem to be largely or wholly lacking in such respects. The difference between a Newton and an idiot, we may say, is immensely greater than the difference in height between the tallest and the shortest adult human beings.

Individuals differ in many ways. Disregarding differences of a physical order, we know that persons differ in sensory acuity whether it be auditory, visual, tactual, or gustatory. They are also dissimilar in perceptual abilities. A long time ago we had given a description of those "who have eyes and see not, and those who have ears and hear not." Some persons experience widely; others, narrowly. This fact applies as well to other mental traits. Individuals are not alike in degree of sustained observation or attention. Some appear to become fatigued very quickly; others seem to be highly resistant in this respect. Individuals show great differences in the rate at which they acquire materials as well as in their degree of retention. Finally, we realize that people differ widely in terms of intelligence. The amount of variation among different individuals in terms of these and other traits is extremely large. Even among those persons grouped together within the same class for instructional purposes, wide variations are found to

occur. Starch, for instance, points out that the most superior individual in such a group may be capable of performing the same task twenty-five times as well as the most inferior.

Differences Are Quantitative. Differences between individuals appear to be mainly quantitative in character. A few persons, for instance, are able to see no colors; a few others can see only certain colors, while a great many persons can see all colors. The same holds true for such functions as memory, imagination, and, particularly, thinking or reasoning. There are unquestionably some persons who are so low in intellectual scale, and so lacking in the full psychological endowment of normal man that no evidence can be found for believing that they are capable in the least degree of reasoning in any true sense of the term. Others, however, enjoy greater degrees of this ability with the upper limits of range marked by the genius. Such differences in abilities can be graphically shown. The total lack of an ability or a trait may be represented by zero. Other degrees of the particular ability may then be placed along the scale. It is in this sense that we say that all abilities are quantitative. Different persons show differences in *degree* or amount of psychological abilities.

Manner of Distribution. The general manner in which physical and psychological traits of the organism distribute is interesting. From such distribution we find, for instance, no evidence tending to substantiate any claim that human beings fall into separate and distinct classes or types. If we arrange the measures or quantitative values obtained for any one trait from a large number of individuals, selected more or less at random, we immediately realize the impossibility of holding to sharply marked types. The form of distribution of the measures of the height of a large number of men or women in a fairly unselected group illustrates this point quite well. All of the measures do not fall at any one place on the scale. A few are relatively small; a few others are relatively large. Between these extremes the other values arrange themselves in a somewhat characteristic manner, as shown, for instance, in Figure 32.

The left end of the base line of Figure 32 represents the height of the shortest; the right end represents the height of the tallest women in a group of 1,052 individuals. The curve shows, furthermore, that the greatest number of measures fall around a central value, representing an approximate height of sixty-two inches. This is the *mode* for this set of values. As we pass from the mode in either direction, the number of measures represented drops off slowly at first, then rather sharply, and again slowly; that is, the frequency declines at varying rates as

one passes in either direction toward the extremes. Moreover, what is true for such physical traits as height, weight, and the like holds likewise for the psychological traits. In Figure 33, in which are shown curves for reaction time, memory, efficiency in motor control, efficiency in giving word opposites, accuracy in judging and reproducing length of line, and efficiency in marking words each containing the two letters *a* and *t*, we discover essentially the same type of distribution found above for height. In general, normal frequency curves (as shown in Figures 32 and 33 are assumed to represent a chance distribution.

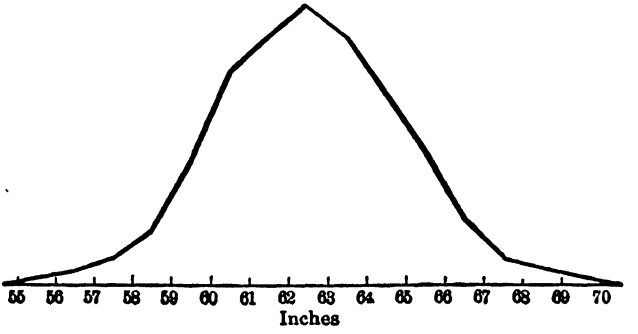


FIG. 32. Distribution of the height of 1,052 women. Note how the curve falls off slowly, then rapidly, then more slowly. From Starch, *Educational Psychology*. By permission of The Macmillan Company.

When applied to human beings they may be taken to represent human traits as they occur by "chance" in an unselected population. A similar type of distribution may be secured from several thousand tosses of a number of coins. The number of times that all the coins show either all heads or all tails will be extremely small. The number of times that half of the coins show heads or tails will be fairly large.

THE SIGNIFICANCE OF INDIVIDUAL DIFFERENCES

The most outstanding problem of the psychologist in the fields of medicine, law, education, industry, and commerce is to determine the nature and the extent of differences between human beings. In no one of these fields does he intelligently attempt to deal with some "average" or "typical" individual. He assumes rather that each person is a personality consisting of a combination of traits and characteristics, which must be understood and, so far as possible, measured before the individual may be adequately dealt with.

He recognizes that all individuals differ in traits, and that he must

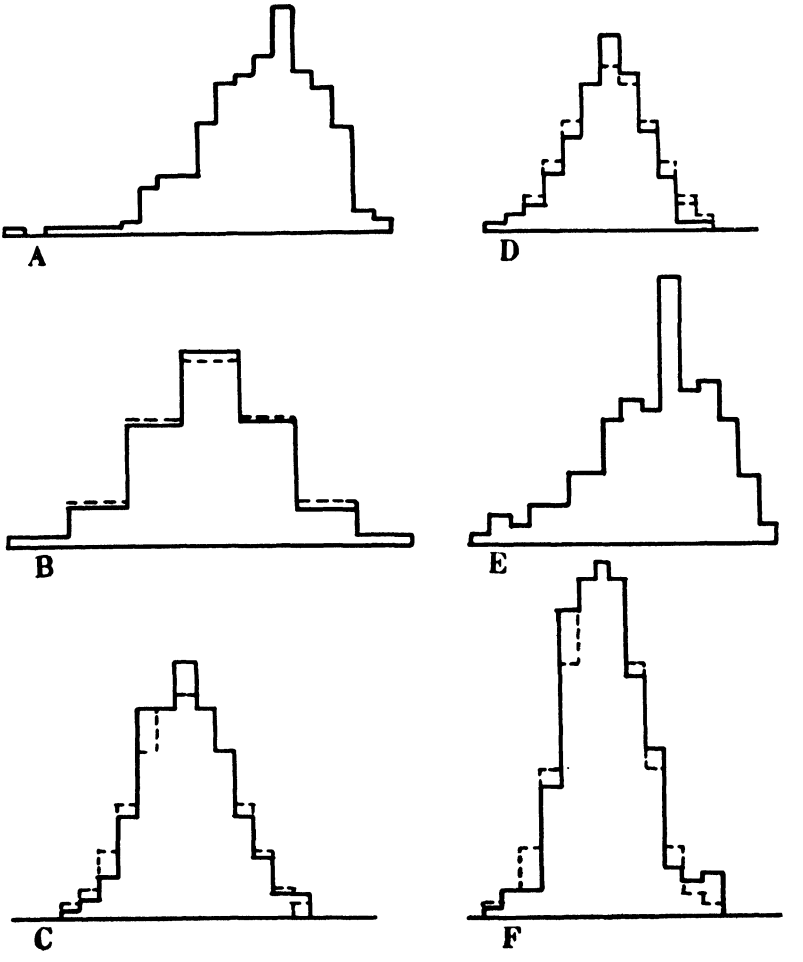


FIG. 33. FORMS OF DISTRIBUTION FOUND IN MENTAL TRAITS

A. Reaction time: 252 college freshmen.
B. Memory of digits: 123 women students.
C. Efficiency in marking A's on a sheet of printed capitals: 312 boys from 12 years 0 months to 13 years 0 months.
D. Efficiency in giving the opposites of words: 239 boys from 12 years 0 months to 13 years 0 months.
E. Accuracy in drawing lines to equal a 100 mm. line: 153 girls from 13 years 0 months to 16 years 0 months.
F. Efficiency in marking words containing each the two letters a and t: 312 boys from 12 years 0 months to 13 years 0 months.

In all six cases the left end of the scale represents the lowest abilities—that is, the longest times in A, the fewest digits in B, etc. The continuous lines give the distributions. The broken lines show symmetrical distributions. From E. Thorndike, *Educational Psychology.*

know something of the nature of a particular individual before he can properly deal with him. No physician or psychiatrist, for example, treats a patient merely as a representative of a disease. Instead, each person is carefully considered as an individual; for it is assumed that the methods which may work quite well with one person suffering with a particular disease may fail to work with another exhibiting essentially the same disease. In law the same situation holds true. The man to be sentenced is an individual, who has a given make-up, perhaps different from that of any other, and who has had a certain history. The witness, too, is not to be treated as a typical, or hypothetical, "average" man. He is to be regarded as having his own particular personality. He may be emotional, or he may be indifferent. He may try to "cover up" by saying very little, or he may seek the same end by being loquacious. In every case he must be intelligently handled if the most desirable results are to be secured.

If a knowledge of individual differences is important in medicine and in law, an equal understanding is of paramount importance in the field of education. Children differ greatly in the abilities which they bring to the class room as well as in the use which they actually make of them. The intellectually inferior and superior, the physically lacking and the physically precocious, and the high strung and the emotionally unstable children are to be properly regarded and treated, if they are to show a desirable development of their potentialities. When we turn to industry, we find that not every man can be placed in charge of a machine, over a group of other men, or at the head of a department. The employer must know something of the intelligence, the temperament, the emotional stability of his various employees before he can expect to achieve a high degree of productive efficiency.

Concerning the significance of a knowledge of individual differences in the applied fields of activities, Hollingworth and Poffenberger write:

> Applied psychology demands that just as much attention be paid to the exception as to the average—that the personal differences be taken into account. . . . The fundamental fact of applied psychology is that the individual is the unit of action, and all advance in this science must rest upon a knowledge of the laws of individual behavior, and the conditions which affect it. To one who reviews the field of modern business, industry and education, the striking thing is the emphasis that is being placed on the individual rather than the group. It can be seen in education in the recognition of the fact that the individual should be the real unit rather than the class, although actual practice is limited to an approximation to this ideal. It can be seen in industry in the use of the piece work system and reward system, which base pay on

what the individual can do; the consideration of the individual in the construction of machinery; the arrangement of hours of labor, rest, vacations; the consideration of the individual in the selection and training of employees (*19*, 17).

DETERMINATION OF DIFFERENCES AMONG INDIVIDUALS

Down through the ages the unceasing quest has been for an understanding of the particular make-up of the human individual; of the nature of the other fellow. Men have turned their eyes to the skies for some glimmer of understanding upon the problem of man's constitutional tendencies. In the conjunction of the stars they read, so they thought, his blessing and his curse. They turned their eyes from the skies and found, on the hands of their fellows, lines and marks which revealed, as they again thought, the long sought secret of his nature. At other times, when such ways went wrong, they found a key to human nature in the facial contour and cranial topography of human beings.

Man has not always been scientific. Least of all has he been scientific in matters pertaining to the nature of his own organism. Keenly desirous of knowing about the traits of the other fellow and lacking scientific training and a critical attitude, he has only too frequently fallen a victim to his own desires. Pseudo-methods have captured his fancy, taken his money, and given him false information. Of the many ways by means of which he has sought to determine the character of his fellow's mental make-up, which are now recognized by educated persons as being wholly unreliable, we mention only two: *viz.*, phrenology and physiognomy. These methods appear to find wide use today among certain groups of individuals. It might be worth while to say a word concerning their nature.

Phrenology. Phrenology is an attempt to determine individual traits from an examination of the size and contour of the head. While certain of the assumptions involved in phrenology are very old, the clear expression and the crystallization of them into a system is to be attributed to Gall. To his efforts in this direction were later added—first, those of Spurzheim and still later, Combe. In brief, the basic assumptions of this attempt to determine in what respects an individual may be long or short in some trait or characteristic are as follows: (1) the mind consists of about thirty-five different emotional, aesthetic, and intellectual faculties (See Figure 34); (2) each of these allegedly independent traits is located in a particular region of the cerebral hemispheres; (3) the degree of development of each of these characteristics is directly determined by the development of this cortical

region; and (4) the degree of development of the cerebral region is shown upon the outer surface of the skull, and the amount of any given trait may be discovered by an examination of the skull. The task is simply one of feeling the bumps and depressions on the individual's head. A large bump means considerable development, a slight bump or a depression means little or no development of some trait.

This method of determining the psychological nature of the human organism is wholly lacking in scientific sanction. Psychologists, for instance, do not believe in faculties; neither do they accept any sharp correspondence between such abilities as perception, memory, or imagination on the one hand, and particular cerebral localities on the other. The whole brain is assumed to function in such activities in a highly integrated way. One part of it does not operate independently to give one of the psychological activities and another part to give another psychological activity. There is, generally speaking, nothing piecemeal about the brain when regarded in terms of function. This does not mean, however, that the brain is wholly equipotential in all its functions. In fact, one of the strongest proofs against phrenology is the fact that those parts of the brain which are alleged by phrenologists to be the seat or the organ of certain character traits have actually been found experimentally to be concerned with duties of a wholly dissimilar nature. A brief examination of Figure 34 will show roughly both the alleged and the actual uses of certain cerebral regions. Finally, psychologists do not accept the assumption of the phrenologists that the brain in its development determines the slight elevations and depressions to be found on the surface of the human skull.

Physiognomy. While phrenology looks to the contour of the head, physiognomy looks largely to the shape of the face and its parts for a clue to the psychological traits of the individual. One fundamental assumption of this alleged method is that psychological states are reflected in facial changes. We have long recognized, of course, the drawn face of the sorrowful, the strained expression of the worried, and the "lighted" face of the joyful. An argument of the physiognomist is that what holds true for the emotions is also true for other and non-emotional states. They likewise express themselves in the face. Thus we hear of intelligent and stupid, secretive and frank faces, and so on. A second major assumption is that the constant entertainment of some mental state produces a permanent and observable modification in the face. Grim minded men have grim faces. The facial lines are assumed to form into patterns and to tell their story of the nature of the individual's psychological life. Finally, it assumes that certain *structural* parts of

the face betray mental traits. We read of chins that denote strength and determination, eyes that betray deceit and dishonesty, and lips that reveal greed and grossness. The following statement will illustrate the point of view and some of the claims of the physiognomist:

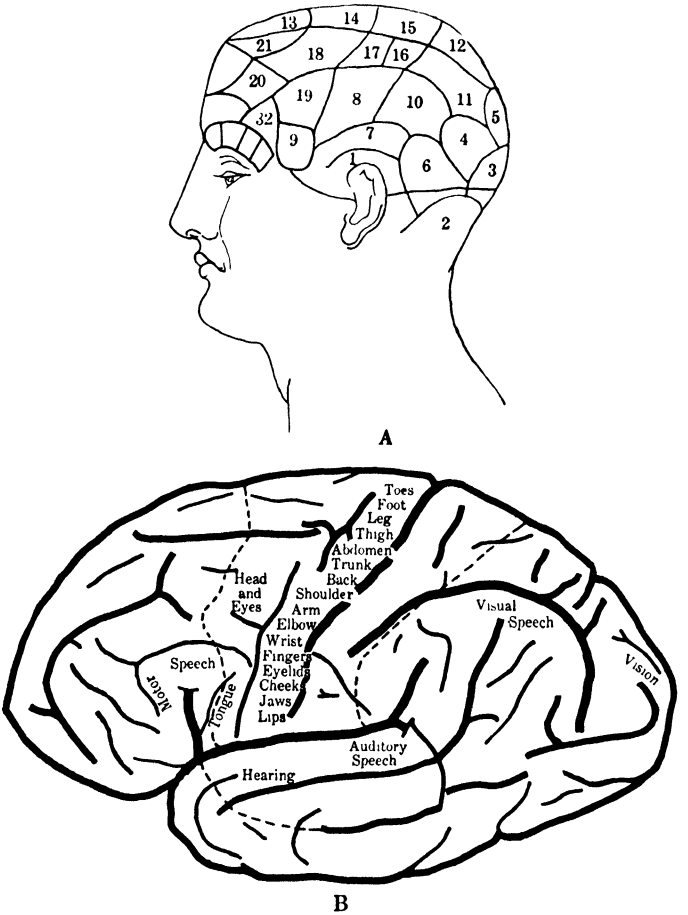


FIG. 34. A. The localization of faculties, according to phrenology. The following faculties are noted: 1. Alimentiveness; 2. Amativeness; 7. Destructiveness; 8. Acquisitiveness; 10. Cautiousness; 14. Reverence; 17. Hope. B. Diagram showing the approximate limits of functional areas, sensory and motor. Left side of cerebrum.

The individual of fine hair, fine-textured skin, delicately chiseled features, slender, graceful body and limbs, as a general rule, is refined, loves beauty and grace, and likes work either purely mental in its nature or offering an opportunity to handle fine, delicate materials and tools. On the other hand, the

man with coarse hair, coarse-textured skin, and large, strongly formed features inclines as a general rule to occupations in which strength, vigor, virility, and ability to live and work in the midst of harsh, rough and unbeautiful conditions are prime requirements. It is no secret to observant employees of labor that blondes, as a rule, are changeable, variety loving, optimistic, and speculative, while brunettes are consistent, steady, dependable, serious, and conservative. It turns out as one might naturally expect that the man who resembles the greyhound in form is quicker, keener, more responsive, and less enduring than the man who resembles the bulldog.

This way, so we know, is no more scientifically acceptable than the way of phrenology. Both represent a purely common-sense way of discovering differences among human beings, and both evidently find very wide employment among our more ignorant contemporaries. That men should be "hired and fired" upon the basis of the possession or the lack of certain facial traits, such as a receding chin, close-set eyes, or full lips is a serious reflection upon the general level of intelligence and understanding of those guilty of such practices. But such practices are not infrequently found. The remedy appears to lie in a proper realization of the true nature of psychology and its methods of measurement.

Psychological Tests. For its work on this problem of psychological differences, science employs its own methods. Its technique consists chiefly in the use of psychological tests together with an employment of elaborate statistical methods for the interpretation of results. Since we shall have occasion from time to time to refer to these tests, we wish to make clear their nature.

There are several general types of tests which have been used to determine the psychological make-up of the individual. One may be roughly considered as a test of *achievement.* A second, which we may call *sensory* and *motor,* may be made to include all those tests of the sensory and motor abilities which are assumed to be largely or wholly independent of training. A third sort of test may be considered as a test of *general capacity* or *intelligence.*

Achievement Tests. This form of test is largely meant to test that which has been acquired. Such tests give a measure, for instance, of how fast an individual can type, how much knowledge an individual possesses about some topic or about the correct and most efficient method of performing some task. In short, it tests knowledge and skill as these are commonly meant. A very common form of this class is known as trade tests. These tests are generally of three main types in terms of the nature of the task set the examinee. They may be verbal,

picture, or performance tests. In the verbal forms, the individual must answer as concisely and as accurately as possible a number of questions touching upon the essential features of a specified task. As illustrative of such devices we give two sample questions from Trade Tests used in the Army to test welders.

What chemical is mixed with water to form acetylene gas?

What is the pressure of an acetylene tank when filled?

The educational tests too are of this general type. The individual is asked to name objects, give definitions, or solve problems. In every case the answer presupposes a particular form of training or a certain degree of knowledge. Tests of achievement may consist largely of pictures and questions. The individual is shown pictures of various forms of apparatus, tools, machinery, and is required to state their use and meaning. Figure 35 gives a sample of this sort of test. It is also taken from a form used by the Army. Finally, such tests may take the form of performance tests. Here the individual is asked to perform a given task under the direction of some one in authority. He may be asked to run a lathe, weld a cylinder block, or type a page.

Sensory and Motor Tests. The second type of test is meant to determine the keenness of the various senses. It has been widely used,

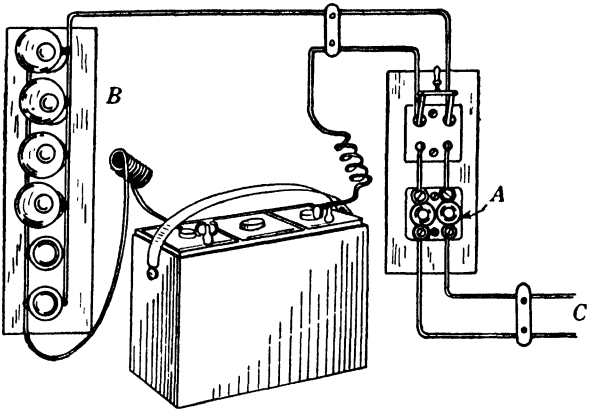


FIG. 35. Simple performance test. The applicant is shown the picture, and is asked to answer questions of the following sort: What is shown at "A"? What are the lamps at "B" used for?

for instance, in the study of differences among races and between the sexes. It consists of such tasks as matching colors, counting ticks of a watch held at varying distances from the ear, discriminating between points placed against the skin, picking out the brighter of two cards of

slightly varying degrees of brightness, and so on. The motor tests aim to secure a measure of fatiguability, steadiness, rapidity of movement, control of direction of movement, and the like. The individual may be asked to run through irregular pathways, hold an electric stylus in holes of varying diameters in a steel plate without touching the sides, tap rapidly for varying lengths of time upon a diaphragm that registers the number and the intensity of the taps, or follow with his hand a rapidly shifting object.

Intelligence Tests. The third large group of tests comprises the many varieties which have been constructed to determine degrees of intelligence. They are given, either individually as in the Binet and its subsequent modifications, or in groups as in the Army Alpha, the Otis, and others.

The Binet and the Stanford Revision of the Binet are two outstanding individual tests which demand an *understanding of the language.* There are several *non-language* or performance tests of an individual nature in which the examinee is required to work upon manual tasks of varying difficulties. The experimenter, for instance, may tap slowly upon a number of blocks (*e.g.*, Knox Cube Test), after which the individual who is being tested is supposed to touch the same blocks in the order followed by the experimenter. Or, the individual may be asked to perform such tasks as completing the Sequin-Goddard form board in a minimal time. The Binet Scale consists of a number of various tests of increasing difficulty. Each division sets a number of problems, some of which are quite simple while others are more difficult. In order to give some notion of the character of this scale we cite sample problems for the ages of three, nine, and fifteen years.

Three Years

Shows nose, eyes, and mouth.
Repeats two digits.
Enumerates objects in a picture.
Gives family name.
Repeats a sentence of six syllables.

Nine Years

Gives change from 20 sous.
Defines in terms better than use.
Recognizes all the pieces of our money.
Enumerates the months.
Understands easy questions.

Fifteen Years

Repeats 7 digits.
Gives 3 rhymes.
Repeats a sentence of 26 syllables.
Interprets a picture.
Solves a problem from several facts.

The Army Alpha is a series of eight tests so constructed as to involve the use of the more important psychological functions. This test was given to large numbers of recruits during the World War. On the whole, it is one of the most carefully prepared of the various group tests. To give some notion of its general nature we cite the following samples from it. They are taken from tests 5 and 6.

Test 5

The words A EATS COW GRASS in that order are mixed up and don't make a sentence; but they would make a sentence if put in the right order: A COW EATS GRASS, and this statement is true.

Again, the words HORSES FEATHERS HAVE ALL would make a sentence if put in the order ALL HORSES HAVE FEATHERS, but this statement is false.

Below are twenty-four mixed-up sentences. Some of them are true and some are false. When I say "go," take these sentences one at a time. Think what each would say if the words were straightened out, but don't write them yourself. Then, if what it *would* say is true, draw a line under the word "true"; if what it *would* say is false, draw a line under the word "false." If you cannot be sure, guess. The two samples are already marked as they should be. Begin with No. 1 and work right down the page until time is called.

Samples a eats cow grass... ..... true..false
horses feathers have all.....true..false

Test 6

	2	4	6	8	10	12	14	16
Samples	9	8	7	6	5	4	3	2
	2	2	3	3	4	4	5	5
	1	7	2	7	3	7	4	7

Look at each row of numbers, and on the two dotted lines write the two numbers that should come next.

After a test has been given to many individuals, for instance, a group composed of males and females, and the scores have been com-

puted, it is then necessary to determine to what extent the individuals as represented by the scores are alike or different. There are essentially two methods by means of which this may easily be done. A comparison of the *average* or median of the groups may be made. Or, the degree of likeness or difference may be brought out by a statement of the number of one group *reaching or exceeding* the median of the other group. If 50% of the one group reach the median of the other, and the ranges are alike, the two groups are said to be identical. The second way is the better. Let us illustrate it. If 60% of the members of a group

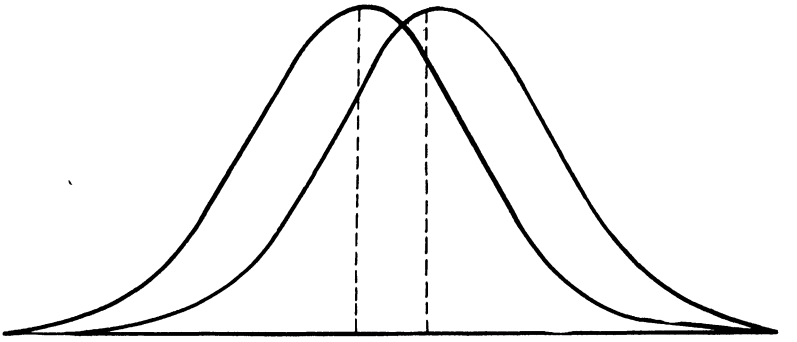


FIG. 36. Curves representing an approximate difference of 20% between medians of two groups. The range is the same.

exceed the median of another group, it means that 10% of the first group are superior to the second group. If 30% of the women, for instance, reach or exceed the median of the men in a given test, it means that should the 20% (50% minus 30%) of the men who excel the women drop out, the remaining 80% would be identical with the women. The following figure may be taken to represent a difference of 20% between the medians of two groups.

Causes of Differences. Differences among individuals appear to rest chiefly upon hereditary, developmental, and environmental factors. Each of such factors as sex, race, age, individual history, drugs, exercise of function, glandular changes as well as many other conditions tends to diversify human beings. A proper description of such dissimilarities or diversities with a statement of their significance for problems of a social, economic, political, artistic, and educational nature represents a major task of psychology. During the remainder of the semester we shall be largely concerned with various problems which bear more or less directly upon this general field of individual differences. We wish to open our discussion of this large topic by considering in this chapter

the nature and possible extent of those differences among individuals which are commonly attributed to race and to sex.

RACE DIFFERENCES

A good definition of race is hard to give. There are, to be sure, many ways of regarding race. Most writers appear to formulate their definitions in terms of one or more of such conditions as common heredity, like psychological nature, common culture, or similar physical features.

Thorndike's definition may be taken as representative of the first way. "A distinct race," he says, "is a group of men who to a considerable extent have in common the same remote ancestry, its present descendants being to a considerable extent confined to that group. The more they all hark back to just the same ancestry, and the more exclusively they represent the present product of this ancestry, the more distinct a race they will be" (*43*, 206). A distinct race, according to Moss, "is a group of people having the same remote ancestry, and consequently having certain physical and mental traits different from those of other races with a totally different ancestry" (p. 93). Humphrey believes that mankind may be divided into races primarily according to physical unlikenesses. Since dissimilarities of mental attributes and capacities, however, are associated with outward physical differences, they are assumed to enter as an important factor in distinguishing the races. Dixon seems to forsake ancestry as a racial criterion in favor of the physical characteristics; for to him, a race is a group defined and characterized by certain physical characteristics. The criteria would then be certain external or superficial signs such as skin and eye pigmentation, the texture of the hair, the characteristics of the nose and the eyes. A second group of criteria would be the internal and the structural and would include, for instance, the form and size of the different parts of the bony skeleton. Cole apparently combines ancestry, physical traits, and common habitat. The term race, he points out, "is used to designate a group of people having in common certain physical characteristics which distinguish them from all other groups who now do or formerly did occupy the same adjacent territory and who have a common descent" (*7*, 366). On the whole, it seems that a race is a group having a common ancestry and descent, similar mental and physical characteristics, and perhaps a common habitat.

Physical Characteristics. On the basis of the color of the skin and character of the hair, mankind is usually classified into five races: the black, yellow, white, red, and brown; although some authorities would limit the classification to the black, the white, and the yellow. The

negro is usually characterized by his black shiny skin, flat nose, large lips, and kinky hair. The yellow race is thought of as being of smaller stature, having slanting eyes, straight hair, and yellow skin. The white race is too familiar to require description. The red and the brown man are characterized, if the former classification of races is accepted, by their skin color, hair, and by lips and cheek bones. For our purpose we need merely to note that physical differences do exist.

Psychological Characteristics. Physical features, which, after all, are reflections of structural patterns and relations, are fairly obvious and under usual conditions are easily determined and measured. But the many psychological characteristics which are to be regarded as a part of man's *functional* nature are a great deal more difficult to determine. Yet an understanding of them is vital to a complete description of a race.

As representatives of the white stock, we are taught that our own race is superior to all others. But the superiority, to be sure, is not so much physical as mental. Mere brawn, we are inclined to feel, is not to be taken as a true criterion of superiority. It is rather to the peculiar character of his mental endowment that the white man looks for the distinctive mark of his uniqueness. He is, he believes, superior in intelligence. But those persons who unquestioningly assume the superiority of the white man not infrequently experience a very distinct shock upon learning that members of other races cherish a like notion about themselves, or suffer from a similar racial complex. Members of other races, too, feel that their own race is superior to all others. Angell points out that the occidental white man in making out a list of the order of races from highest to lowest in terms of intelligence "unhesitatingly puts himself at the head of the list, with the Asiatic ranking next, American Indians perhaps next, the African next, and at the bottom possibly the Bushmen of Australia." He then remarks: "It is perhaps needless to say that the Asiatic in making out his list would accord a different position to his own group. Nor is any great racial stock disposed to accept an inferior status" (*2*, 114).

Now, to what extent are such conflicting beliefs in racial superiority actually grounded upon facts? Can we find acceptable evidence tending to show a mental endowment in any one race superior to that of all other races? We know, of course, that races differ physically; but we do not wish to discuss that aspect of the problem. We do desire, however, to review the nature of some of the evidence which has been offered upon this problem of racial superiority and inferiority of a psychological sort.

Before we open our discussion of this question of the nature of psychological differences among the races, we might do well to say a further word concerning the method and weapons of attack in this field. The material of a factual sort which bears upon this problem of race likenesses and differences has been largely derived from the use of psychological tests. In this connection we must recognize that one primary weakness has been pointed out—it is the unavoidable weakness of methodology. Both the employment of tests and the results obtained from them with different races have been subjected repeatedly to criticism on the ground that they are unfair to some of the races examined. The tests have been designed, so it is claimed, in the language of one race to test men of another race, seriously handicapped perhaps by an imperfect mastery of the language of the test. Again, the general employment of such tests has been questioned from the standpoint of "unfair" sampling. The members of a racial group who are tested, it is pointed out, may be decidedly inferior to the total racial population of which they are a part. We do recognize, of course, that diverse selective forces frequently operate in determining the migration of peoples. It may be that certain racial groups in this country which are assumed to be representative of their stock actually fail in this respect. It is known, of course, that wide variations may occur within the same racial stock. The group to be examined must be representative of the total racial population. Should it consist chiefly of individuals whose abilities would be represented either by the upper or by the lower end of a distribution curve of the abilities of the race, the results would lose much of their significance. Finally, errors may come in interpreting and evaluating the results. The possible source of confusion here is to be attributed mainly to certain assumptions made in the construction and in the administration of the tests. It is assumed that the traits—for example, intelligence—tested are inherent; that is, they are not subject to training, and that the individuals who are tested possess equal opportunities for achieving. If the traits tested are wholly innate, if they are not significantly affected by training, and if individuals are not handicapped or penalized by the mechanics of the tests and the test conditions, then we are justified in saying that we have a fair method of attack. If consistent and reliable differences occur among racial groups under such test conditions, we are fairly safe in saying that they are racial in determination. With this orientation in mind, let us proceed with our task. We shall take as our first problem a comparative investigation of the intelligence of the *Negro*, the *Indian*, the *Oriental*, and the *White*.

RACIAL INTELLIGENCE

Negro. The Negro has been in our midst for a long time. He has been very closely associated with us in various relations among which the economic and industrial stand out. Considered in terms of numbers, he constitutes no insignificant part of the population of the land; yet in a way he is not an integral part of our own population. His culture is not our culture. His world is not our world. Thomas remarks concerning this point: "It is not too much to say that no Negro and no mulatto in America at least has ever been fully in the white man's world" (*40*, 65). Our judgment of the Negro should perhaps be made with the realization that he belongs to a separate group, both racially and culturally.

From the Army Alpha administered to enlisted men during the World War a median score of twenty-three was secured for Negro recruits. Upon the same test white recruits gave a median score of sixty-three. The following table gives a comparison of Negroes and whites in terms of scores made on the Army Alpha test.

TABLE VI

A COMPARISON OF THE ARMY ALPHA SCORES OF NEGROES AND WHITES

GROUP	Score in Letter Grades		
	D, D−	C−, C, C+	A, B
Whites of five northern camps	19.4%	67.6%	13.0%
Negroes of five northern camps	45.3	51.1	3.6
Whites of five southern camps	34.8	56.8	8.4
Negroes of five southern camps	78.7	20.6	.7

If we look for the precise nature of the Negro's mental inferiority to the white, we find it most clearly shown, according to results from certain intelligence tests, in his poorer performance upon those phases of the tests which involve a knowledge and use of abstract terms. It also appears that the Negro is somewhat less accurate, on the whole, than the white. Although not wholly unambiguous, the evidence seems to indicate, in general, that the chief intellectual deficiency of the Negro lies along the lines of "abstract" thinking and logical analysis of situations.

The mulatto is generally described as being of a higher intellectual level than the full-blooded Negro, a fact which is most commonly attributed to the presence of white blood. Such an explanation is based, of course, upon the assumption that white blood is superior to Negro

blood,—an assumption, we must warn, that is not grounded solely on facts. Referring to the comparative abilities of the Negro and the mulatto, Peterson writes, "Intelligence test results, so far as they go, indicate that the mulatto or the mixed-blooded Negro in America generally is a little more efficient than the pure Negro" (*33*, 136). From the nature of the scores on the Army intelligence tests, Ferguson states that the Negroes with the greater amount of white blood, as indicated by skin color, obtain uniformly higher average scores on a group test than do those with less white blood. We might say the mulatto is the stepping stone from the black to the white race and admit that some of them do show a marked intellectual ability. Reuter points out that the dozen or score of Negroes everywhere mentioned as having attained some degree of eminence are, in all but one or two cases, men possessing more Caucasian than Negro blood (*37*, 83).

Although the intellectual superiority of the white is so brazenly asserted and accepted without question by many, we must bear in mind that perhaps there are few whites who have a greater intelligence than the highest of the Negroes and that there are few Negroes who have less intelligence than the dullest of the whites (*12*).

Indian. Although he has often shown his worth in his contacts with whites, the Indian is alleged to be intellectually inferior to the white but more capable than the Negro. We learn that 94 per cent of a group of Indians tested below age on the Binet test. On the same scale, 21 per cent of a comparison group of whites were below normal age. The use of the Otis Intelligence tests with Indian and white groups gave median scores of 83 for the former and 123 for the latter stock. With a group numbering approximately one thousand Indian children of pure stock, Garth secured a median I.Q. of 67, a score that stood approximately thirty-three points below the average of white children. On the whole, Indian children have been found to be somewhat weak in tests involving definition and comparison. Indians, who possess a strain of white blood, are reported to manifest on the average a higher degree of intelligence than the members of the full-blooded lines. Hunter, for example, has drawn comparisons between those Indian stocks which are pure and those in which crossing with whites has occurred. The evidence apparently points to the intellectual superiority of the mixed-blooded individuals. Other investigators have found essentially the same relationship to hold. Reuter reports that in North Brazil the mixed-blooded group of Portuguese, Indian, and Negro ancestry are on a distinctly higher social and intellectual plane than are either the full-blooded Negroes or the native Indians.

Oriental. There is little direct experimental evidence bearing upon the problem of the intelligence of the Oriental race. Were it not for national uprising, international disputes, and Bolshevism even less perhaps would be known. The evidence at hand leads some to the conclusion that although inferior to the Caucasians, the Oriental peoples are not as inferior as either the Negro or the Indian. Their inferiority, in fact, is so small that it might be due to factors, other than intelligence, which go toward making the final intelligence score.

We owe to Waugh a comparison of the intelligence status of college students of Oriental and American extraction. He gave tests to Indian (Asia), Chinese, and American university students. Table VII shows the results of this study. The Americans excel the Chinese in all six tests, and the Indian in three. On the whole, the differences between

TABLE VII
(From McDougall)

Test	Scores		
	American	Chinese	Indian
1. Concentration of Attention	75	75	62
2. Learning Speed	66	62	45
3. Association Time	46	38	58
4. Memory—Immediate	58	38	54
5. Memory—Deferred	80	38	88
6. Range of Information	23	15	24

the three groups are not significantly large. Table VIII shows in greater detail the nature of the performance of various racial stocks on intelligence tests, as determined by Murdock (31a) in a fairly elaborate study. Again we find the representatives of the Caucasian stock standing out.

According to Porteus, Japanese appear to be superior both to Chinese and to Portuguese stocks as judged in terms of persistence of effort and mental alertness. Although Japanese show somewhat less learning capacity than the Chinese, they are superior to the Portuguese in this respect. Wang, after surveying in an interesting way the evidence concerning the intelligence of the Chinese as compared with other peoples, concludes that "the Chinese are justified in being proud of their heredity." He then adds, "They have led civilization in the past, and they will contribute much in the future" (*44*, 102). Writing from a slightly more scientific standpoint than Wang, Yeung finds that there is no striking difference between the intelligence of Chinese and American children. He bases his statement upon the results obtained from the

TABLE VIII

PERCENTAGE OF EACH RACIAL GROUP WHICH OVERLAPS THE MEDIAN OF AMERICANS

GROUP	No. of Cases	School Grade Attained	National Intelligence Test	Army Beta Test	National Intelligence Test, Verbal Elements	National Intelligence Test, Non-verbal Elements
Americans (North European descent)	57	50	50	50	50	50
American-Hawaiians	59	20	11	14	8	29
Chinese	58	24	14	23	4	42
Japanese	61	15	4	42	2	50.6
Portuguese	57	9	1.6	5	1.5	16
Korean	33	11	8	32	4	26
Chinese-Hawaiian	33	11	2	9	1	19
Hawaiian	58	9	2	3	3	12
Country Japanese	56	1	.6	1	.1	9
Porto Rican	23	2	.3	.5	.2	1
Filipino	23	1	.1	.2	1	7

use of the Stanford Revision of the Binet test with 62 boys and 46 girls all of whom were of Chinese stock but of American birth. The median intelligence quotient for the total group was 97. This is to be compared with a median I. Q. of 99 which Terman found for approximately 1,000 American children in an unselected group. We are inclined to agree with Yeung that the abilities shown by these Chinese children do not appear to be significantly different from those of American children.

European. The immigrant group in the United States are found to differ from their immediate descendants in their performances on the ordinary type of intelligence tests. Here, as in any case where individual differences are shown, the opposing theories of heredity and environment are offered in explanation. Those who believe that no true differences really exist between races, but that such differences as are found are really due to some quality of the test, usually attack the tests on the basis that they offer a language handicap to the foreign born, or that the individual tested has been reared in a home where a language other than English is spoken. To test this assumption, Goodenough used a group test of a non-verbal sort with a large number of individuals, including Americans, Armenians, Italians, Spanish Mexicans, California Negroes, Haupa Valley Indians, Jews, Chinese, Japanese, Germans, Portuguese, English, and Scotch. In general, she found that the rank orders of the various racial groups corresponded somewhat closely to

the results of other investigators who had used verbal tests with similar peoples.

We owe to the World War a certain amount of very valuable data concerning the intelligence of various racial stocks. At that time many thousands of men were given either the Army Alpha or the Army Beta. Table IX shows the percentage of foreign-born men in the draft, rated as A or B and as D, D−, or E on the Army tests. A and B indicate superior; D, D−, and E represent inferior men.

TABLE IX

PERCENTAGES OF FOREIGN-BORN DRAFTED MEN RATED AS A OR B AND AS D, D−, OR E ON THE ARMY TESTS

(From Pintner)

COUNTRY	A and B	D, D−, and E	COUNTRY	A and B	D, D−, and E
England	19.7	8.7	Ireland	4.1	39.4
Scotland	13.0	13.6	All foreign countries	4.0	45.6
White draft	12.1	24.1	Turkey	3.4	42.0
Holland	10.7	9.2	Austria	3.4	37.5
Canada	10.5	19.5	Russia	2.7	60.4
Germany	8.3	15.0	Greece	2.1	43.6
Denmark	5.4	13.4	Italy	.8	63.4
Sweden	4.3	19.4	Belgium	.8	24.0
Norway	4.1	25.6	Poland	.5	69.9

Judging in terms of the per cent of D, D−, and E scores, it seems that of the European races the English are most intelligent with the Dutch almost as intelligent, followed in turn by the Danes, the Scotch, and the Germans. The Poles are found to be least intelligent with the Italians showing a somewhat similar status. Concerning this last point we might say that other sources appear also to show an inferior performance by Italians on other forms of mental tests. Murdock, for instance, gave the Pressey group tests to 489 Jewish children, 499 Italians, and 485 Americans from two New York public schools. These children were all in the fifth, sixth, seventh, or in the lower half of the eighth grades. The investigation was undertaken after it was observed that in the social activities in the settlements the Jewish children seemed to crowd the Italian children into the background. Her results show the Jewish and the American children to be fairly equal, and superior to the Italian children.

We have examined certain lines of evidence bearing upon the problems of racial differences in intelligence. Some writers definitely agree that various races possess varying degrees of intelligence. Others

assume that all races have, so to speak, been cut out of the same piece of cloth. The differences which appear when mental tests are given are to be attributed to environmental differences or to inadequacies in the tests. We might well inquire whether we have any evidence aside from that given by mental tests which might tend to throw additional light upon this problem of racial endowment. By way of answer we find that many believe that the ability to achieve in the class room or in the laboratory constitutes a worth-while measure of racial intelligence. We have, therefore, to look for a moment at the problem of race differences in *educational achievement.*

Educational Achievement. We wish to examine very briefly the nature of certain differences which appear among the students of various races in terms of academic achievement. Mayo, for instance, compared the academic records of 150 Negro pupils in New York City schools with the records of a like number of white pupils selected under somewhat similar conditions. From the results of this study we learn that "colored beginners in high schools in New York City differ from whites in their careers there as follows: (1) On the average they are seven months older, only 36 per cent of them being as young as the median white. (2) They continue in the high school longer. (3) In achievement in the different studies they are somewhat, but not very much, inferior. The general tendency is for only three-tenths of them to reach the median record for whites. (4) The difference is greatest in the case of English, in which only 24 per cent of the colored pupils reach or exceed the median for whites" (*43*, 208).

White and colored students in the Baltimore schools were studied by McCall. His findings are fairly similar to those of Mayo. The Negro children apparently fall gradually behind more and more each year as they advance. This slow failure has been attributed to the fact that as the pupil advances, the work of the high school becomes more and more abstract. If, as Derrick, for instance, claims, the negro is better in concrete than in abstract problems, he might find increasing difficulty with the academic subjects. His ability to handle commonsense and practical situations of a familiar type, and his ability in rote learning would aid him in keeping abreast of the white pupils during his earlier years in school.

Negroes register, of course, in institutions of higher learning, but Ellis has pointed out that full-blooded Negroes are infrequently found in the graduate schools. "Those classed as Negroes," he says, "are usually mulattoes." He then adds, "Even disregarding this fact it is undeniable that the work of the Negro is much inferior to that of the white. No Negro has attained first rank as a scientist" (*9*, 289).

Although Indians have matriculated in fairly large numbers in our colleges and institutions, there seems to be little concrete evidence concerning their achievement in an academic way. No thorough comparison of their school grades with those of the white has been made. It is recognized that they have, on the whole, done respectably in their school work. Perhaps their alleged superiority in the matter of mental-fatigue together with their tendency toward a high degree of accuracy in performance, as pointed out by some investigators, is of aid to them in overcoming the intellectual handicap under which, according to the results of tests, we are led to believe they labor.

The yellow race is apparently the only race, aside from the white, which lifts its head high in defiance of any race prejudice, invades the American universities, and demonstrates both ability and interest in education. In these two qualities they appear to be the white man's equal. The Chinese have been accused, however, of inferiority on the ground that they have not produced any great scientists. Wang, however, answers such an accusation by saying, "It is true that the Chinese have not yet made any great contribution to pure science, but this is due to a lack of scientific environment and not due to a deficiency in heredity" (*44*, 101).

SENSORY ACUITY

Travelers at various times have attributed remarkable perceptual abilities to their native guides. The earliest study of real worth upon this question of comparative sensory abilities of "primitive" and "civilized" peoples was made by Woodworth. His report upon visual keenness among individuals of the former sort cast much doubt upon the truth of some of our travel stories. While the eyesight of the natives[1] tested was good, it was by no means extraordinary. Ranke found on testing natives of Brazil, a race widely noted for their remarkable vision, that their ability to discern the position of a letter or the like at a distance was not exceptionally good. Their ability fell within the range of the European. Rivers, from the results of tests upon Papuans, was inclined to rate them as superior to the Europeans in visual keenness. But, on the other hand, auditory differences in favor of the Caucasian appeared. In tests in which the ticking of a watch or a clock was used the Papuans were found to be inferior to Europeans. Furthermore, Bruner found that only 5 per cent of Filipinos equalled or exceeded the median of the white American in auditory keenness. Moreover, neither

[1] At the St. Louis Exposition, in 1904.

Patagonians nor Pygmies, when tested, equalled the median of the white American. The group tested was too small, however, to make the finding wholly conclusive. Thorndike is inclined to believe that such auditory differences in favor of the white "are probably due in large measure and possibly *in toto* to the greater cleanliness, freedom from injury to the ear, and special training in hearing a click transmitted by telephone" (*43*, 212).

McDougall, testing a group of Papuans, found a number with extremely fine power of tactual discrimination as measured by the perception of the least possible difference between two objects applied to the skin. They excelled the Europeans in this respect. Other native stocks, such as Indians, Filipinos, and Africans, tested in the same way were quite similar to the whites. More interesting is the fact that the results of various investigators such as McDougall, Woodworth, and Bruner agree that greater pressure on the skin is required to produce a report of pain in the members of some of the above mentioned races than in whites. Woodworth concludes, "If one is satisfied with a slight discomfort, a moderate pressure will be enough; but if a sharp twinge is demanded, the pressure must be considerably increased. Most whites under the conditions of the test are satisfied with slight discomfort, while my impression in watching the Indians was that they were waiting to be really hurt. The racial difference would accordingly be one in the conception of pain, or in understanding the test, rather than in the pain sense" (*50*, 177). Woodworth's conclusion that "on the whole, the keenness of the senses seems to be about on a par in the various races of mankind," although arrived at a quarter of a century ago, still seems to be true.

EMOTION AND TEMPERAMENT

Negro. The Negro's emotions are generally believed to be less inhibited than the white's. What the Negro may chance to lack by way of intellectual endowment, he is said to make up for by his greater emotionality. Whether his heightened excitability is actually an inherent racial characteristic or one of many characteristics resulting from his cultural state, it is impossible to say. Increased education is supposed to bring greater powers of inhibition. It is quite possible that a universal system of free education for the Negro would result in a change both in his cultural level and in his emotional life. Compared with whites he is supposed to be less ambitious and more lazy. We have to consider him, however, in his total cultural and economic setting. It may very well be that, deprived of opportunities for the fuller expression of his

abilities, he has developed the safest attitude possible; namely, that of indifference to the future. The present is about all he has; he lives for it. Since he is fairly easily satisfied, he seems actually to have decidedly fewer serious conflicts than his white associates. The absence of major conflicts is cited as one "cause" of the low suicide rate found among Negroes. The following data, for instance, show a suicide rate three times greater for the white than for the Negro for the same period (1919–1923)

TABLE X

SUICIDE RATE PER 100,000 POPULATION (*29*, 102)

	1919	1920	1921	1922	1923
South:					
Average white	6.9	6.3	8.7	7.7	6.9
Average colored	1.6	1.8	2.4	2.1	2.0
Whole United States:					
Average for both races	11.4	11.2	12.6	11.9	11.6

Emotional and temperamental differences between whites and Negroes as measured by the Downey tests appear to stand out. McFadden and Dashiell, for example, tested groups of each race for such traits as the following: (1) Speed of movement (whether a person moves quickly or slowly) as shown by tests of handwriting; (2) Freedom from load (the tendency to warm up rapidly and work at high speed without external pressure); (3) Flexibility (ease and effectiveness in adaptability) as shown by ability to modify writing according to oral instruction; (4) Speed of decision, as shown by speed of checking words "which describe *you*"; (5) Motor impulsion (impetuosity and energy of reaction) as shown by tests of writing under various forms of distraction; (6) Reaction to contradiction (the degree of confidence with which one maintains his opinion against contradiction); (7) Resistance to opposition (the tendency to overcome obstruction) as shown when one's writing is interfered with during a test; (8) Finality of judgment (whether one wavers or perseveres in his opinions) as shown by the tendency to change judgments expressed in an earlier test; (9) Motor inhibition (a test of "motor control, imperturbability, and patience") as shown by ability to write more and more slowly in a series of tests; (10) Interest in detail as shown by ability to copy writing specimens exactly; and (11) Coördination of impulses ("capacity to handle a complex situation successfully without forgetting any of the factors involved") as shown by ability to follow a series of requirements concerning a handwriting test.

From these results it appears that the average white student has greater speed of movement and slightly greater freedom from load. Moreover, he has somewhat greater flexibility and ability to meet new situations in life, but he is slower in making decisions. Furthermore, he is less forceful when contradicted, although he is firmer when confronted by obstacles or physical opposition, and he takes about the same time or slightly longer in reconsidering his decisions. Finally, he has a markedly greater ability to coördinate his impulses to meet confusing and conflicting situations (*27*, 39).

From a survey of the Negro in terms of such traits as optimism, affability, gregariousness, and sociability, McDougall suggests that the Negro represents the true extrovert type of racial stock. Those characteristics commonly attributed to the extroverted individual are here found as racial features.

Indian. We possess extremely little knowledge of an experimental sort of the emotional life of the American Indian. Most of our information is derived from superficial observation of members of this stock. We commonly attribute great bravery and resignation in the face of the inevitable, and less demonstrativeness in joy or in sorrow than is found in the white. As a whole, they fit the description commonly given of the stoic. McDougall believes that Indians are of the extreme introvert type of individual.

Oriental. Using his own maze tests, Porteus examined groups of Japanese, Chinese, and Portuguese. Although maze learning is really a form of motor learning, it serves also as a means of testing temperament. It helps in answering such questions as, "Does the individual, for instance, 'blow up' when he gets into a blind alley?" "Is he easily discouraged when he fails to learn?" "Is he erratic in his attack?" The tests consisted of a series of printed mazes, each more difficult than the previous, through which the individual traced his way. The tests were designed especially to test the persistence of effort, resistance to suggestion, mental alertness, and power to inhibit or control nervousness and the emotions. As a general outcome of the study, the Japanese proved to be superior in all four of the above traits, followed by the Chinese, with the Portuguese making the poorest showing on the tests. Porteus relates the results of his study of these three groups to troubles, which they apparently suffer, as judged by the proportionate number of each group brought into the clinic. He points out that the representation of the races, in the cases referred to the psychological clinic as being mentally retarded, is in proportion to the results noted in the temperament tests. Thus the Portuguese with inferior intelligence plus

temperamental inadequacy show the highest percentage of mental retardation, while the Japanese show the lowest.

European. We have used the word European to denote a race. This is not a strictly accurate use of the term, for the European, according to our former definitions of race, is not a stock distinct from the other races, unless we mean by European the Caucasian race. While writers on race psychology frequently speak of the German, the French, and the Italians as constituting distinct races, these are in reality nationalities. A better grouping, perhaps, would give two or three stocks in Europe. We might follow McDougall in dividing Europeans into two distinct lines; *viz.*, the Nordic and the Mediterranean. Between these, McDougall finds significant differences. The Nordic race, he believes, is "constitutionally introvert; it is strong in the instinct of curiosity, the root of wonder; weak in the herd instinct, the root of sociability. In the Mediterranean race these peculiarities are reversed; it is extrovert, weak in curiosity, strong in sociability" (*26*, 87). The significance of this classification appears when we consider the suicide rates for these two large racial divisions. Where the Nordic race predominates, suicide is rather frequent; where the Mediterranean race predominates, it is somewhat rare. The following data show the number of suicides per million among the various peoples inhabiting certain European countries.

TABLE XI

SUICIDE RATE PER MILLION AMONG SOME EUROPEAN STOCKS

Nordic	
Denmark	268
Scandinavia	127
N. Germany	150
S. Germany	165
England	72
S. Australia	90
Wales	52
Mediterranean	
Spain	17
S. Italy	26

One glance at the table will suffice to make clear that suicide is most frequent among the people of the Scandinavian countries, and moderately high in England and South Australia. All three of these countries are Nordic in population with Scandinavia having the most purely Nordic population. Where Nordic blood is scarce, as in Spain and in South Italy, the suicide rate is correspondingly low.

In religion this same classification serves to explain partly why the

Nordic peoples do not adhere to any great extent to the Catholic faith. To this type of individual the display and the symbolism of Catholicism make little appeal. Concerning this point, McDougall inquires, "Is it mere coincidence that the peoples in which predominates the blood of the curious, inquiring, unsociable, reflective, introverted Nordic race, and these only with few small exceptions, have broken away from the religion of authority, of convention, of formal ritual, of outward action and emotional display?" (*26*, 102).

Race Theories. Two outstanding theories of the nature of racial superiority in achievement seem to prevail. One group of students holds that the superiority in achievement of the white race is a mere accident due to favorable circumstances rather than to superior ability. These students tend to treat lightly all claims stressing racial difference whether intellectual, emotional, or temperamental. Porteus and Babcock, for instance, have aptly named these persons, who regard the differences between races as being due largely to environment, "Race Levellers." All races to such individuals are in reality potentially equal in intellectual and emotional traits. Another group believes that racial achievement and racial intelligence are positively correlated. The white race is superior to all other races in achievement and culture simply because of its superior intelligence. Of all the races the Nordic (as the student may have guessed) is most superior.

Our task here is to set forth certain experimental and investigational findings rather than to form opinions for the individual. The fact that one group of serious workers should hold to one view while another group composed of able students should see fit to hold to another attests to the desirability of maintaining an open mind and suspended judgment.

The student should realize the nature of the difficulties in the way of testing racial differences. He should bear in mind differences in culture and in language as well as those of an economic, political, and industrial nature. He must have due regard for the claims of unfair sampling and language handicap. It may be that all races are alike; it may also be possible that selective forces have actually operated through the ages to produce superior and inferior peoples. Differences in achievement would then be understood in terms of superior and inferior endowment. It is indeed very easy to see the white race as the favored one in this respect. Moreover, it is indeed difficult to see the Bushmen and the Pygmies as intellectually equal to some of the other races. If we grant differences between such peoples and the Caucasian, for example, we might likewise grant differences between still other races and the Caucasian.

SEX DIFFERENCES

We have briefly viewed certain lines of evidence bearing upon the problem of racial differences. Of the hereditary conditions besides race which supposedly produce differences among individuals, no one is more important than sex. We desire to consider for a moment the significance of sex as a possible determiner of differences among human beings.

The world has been sex-minded for a long time. Eve, for instance, is credited—among a great many other traits—with having been more gullible, more curious, more foolish than Adam. We are not told, however, whether these early differences were chiefly innate or were largely acquired under life in a Garden of Eden. A long time ago, we learn, a great religion saw fit to include in its prayers such a phrase as "Thanks be to God that I was not born a woman."

Now how far can we go in assuming that women of today actually differ from their male contemporaries because of sex? What is the nature of these differences in make-up between male and female that man should be rendered prayerfully thankful for his sex? Is it that he really finds himself innately and unquestionably superior to the other half of his species; or is it but another example of his "self-assertive instinct" at its important task of seeking to dominate the female? Or is it that he fondly desires, but factually lacks, proof of his inherent superiority and seeks to supply by assumption what he lacks in fact?

Non-psychological Differences. Certain non-psychological features of man are unquestionably different from those of woman. For instance, the woman's skull is narrower than the man's. The average man is approximately four inches taller than the average woman and about twenty pounds heavier. Men supposedly have more muscle tissue, and the women more fat tissue. But it may be that the white-collared man and the athletic woman are slowly upsetting such figures. In women the trunk is relatively longer, and the limbs relatively shorter than in men. The lung capacity of women is less, and they consume slightly less oxygen than men of equal weight. The basal metabolism for males has been estimated to be some 3 to 6 per cent greater than for females of similar height and weight. The cause apparently relates to the greater proportion of subcutaneous fat found in women, which in turn indicates a smaller proportion of active protoplasmic tissue. Men are physically stronger than women, even more so than the difference in bodily size and weight would lead us to expect. The average brain weight for man is 1,400 grams and for women 1,350 grams. But Ellis has pointed out that when brain weight is considered in relation to actual

body weight, the brain weight of woman is equal to or greater than the brain weight of man. Women also have a faster pulse rate as well as a more variable blood pressure under conditions of controlled quiet.

Women are said to possess a relatively greater energy reserve than men in such matters as ability to go without food or sleep while still continuing with their activities, although in the field of muscular activity men appear to have greater endurance. Finally, differences in susceptibility to disease appear. Burnham, Burgenstein, and others have found that women are apparently more susceptible than men to some, and less susceptible than men to other diseases, both of a pathogenic and mental sort. Women are supposedly less inclined than men to suffer from diphtheria and dementia praecox.

Some writers have pointed to a difference in efficiency between the sexes because of the presence in the one of a monthly sex cycle. From a study of 23 subjects, Hollingworth found, however, that menstruation, is, on the whole, a less serious handicap to women than is commonly supposed. She based her conclusion upon the results from four psychological tests given her subjects. No influence was noted on tapping ability; neither was there any indication of increased disturbance in steadiness. Negative results were also found in controlled association and in the learning tests. There is, then, according to Hollingworth, no necessary and characteristic inefficiency at menstrual periods. Such results, however, are not in accordance with the results of some investigations made in industry upon the number of days women fail to work, allegedly because of menstruation. But here the conditions are often more social than sexual. Individuals frequently appear to take unfair advantage of society's attitude toward an organic condition and so secure release from active duty.

Motor Abilities. It would seem, because they are stronger and heavier, that men would excel in those psychological tests in which a premium is placed upon motor ability. This has not, however, been found to be uniformly true. Women are better than men in some motor activities, while men are superior to the women in other forms. On the whole, men outrank women in tapping tests, reaction time tests, thrusting at a target, drawing lines, and in motor coördination of the type involved in the manipulation of mechanical contrivances. On the other hand, women stand out in such tests as dealing and sorting cards, sorting the letters of the alphabet, mirror drawing, substitution tests (placing digits in geometric figures), and cancellation tests (crossing out letters). Girls excel in legibility, speed, and form of handwriting—a fact cited by some as contributing to their demonstrated superiority

over boys in matters of scholastic achievement. In this general connection, we might add, finally, that girls walk and talk at an earlier chronological age than do boys.

In automobile driving, where motor control and a knowledge of mechanics are, of course, useful to both sexes, the women, according to Moss, appear to know about as much as the men. He tested 500 university students upon a knowledge of the mechanism of motor cars and problems of driving. His results indicate that 40 per cent of the women know as much about the mechanics of a car and how to operate it as 50 per cent of the men. Moss believes that in this field "where knowledge of mechanics is useful to both sexes, women do not prove very inferior to the men" (*29*, 181). It would seem, on the whole, that any superiority of man in such matters as knowledge of the conditions and the operation of mechanical contrivances is largely a result of purely environmental conditions.

Sensation and Perception. Both men and women have sense organs, nervous systems, muscles, and other necessary mechanisms for producing reactions to stimuli. In the following discussion we shall endeavor to indicate the manner in which sexes have been found to differ in fineness of discrimination, in threshold limits, and in degree of sensitivity.

Among the many studies of sensory and perceptual processes in the two sexes, those of Woolley are outstanding. She found that while men do appreciably better in discriminating brightnesses, the women are correspondingly better in color discrimination. Neither is superior to the other in the matter of the upper and lower limits of auditory sensitivity. Women, however, are apparently more able to perceive smaller differences in pitch between two tones. In taste and smell, the differences, while slight, tend to favor the women. Women also show a greater sensitiveness to pain, a finding which some have sought to explain in terms of a difference between men and women in the concept of pain. The men might not say that there was any pain, until it was fairly intense, while women might be satisfied with a minimum degree of pain before reporting. Finally, men are apparently keener than women in tasks involving kinaesthetic perception as, for example, in lifting weights.

A general conclusion concerning the relative sensory and motor abilities of the two sexes might be offered in this manner. Women, generally speaking, show varying degrees of superiority over the men in terms of the former abilities. In motor abilities men are superior to the women. Table XII shows the percentage of men reaching or exceeding the median of the women for a number of tests of sensory and motor

ability. A percentage less than 50 means that the women are better, on an average, than men. A percentage greater than 50 signifies that women are inferior, on an average, to men.

TABLE XII

PERCENTAGES OF MEN REACHING OR EXCEEDING THE MEDIAN OF THE WOMEN ON MOTOR AND SENSORY TESTS

TESTS	PERCENTAGE
Motor	
1. Reaction time	68
2. Tapping	81
3. Thrusting at target	60
4. Lifting weights	66
5. Drawing lines	72
6. Sorting cards, accuracy	44
7. Sorting cards, speed	14
Sensory	
8. Threshold of pain	46
9. Threshold of taste	34
10. Threshold of smell	43
11. Two-point discrimination	18

In seven tests involving motor abilities, the men are better in five; the women in two. In all four tests principally involving sensory abilities, the women are superior to the men. In some cases, the differences are slight; in others they are rather large.

Emotions, Moods, Beliefs, and Interests. It has long been claimed that women are more emotional than men. Women have been widely assumed to be innately more sympathetic, more religious, more self-sacrificing, while men are assumed to be more indifferent, less religious, more selfish. Such claims suffer seriously, however, from a lack of factual foundation. That men and women differ in terms of emotional behavior is evident, but whether such differences are *innate* is as yet an unsettled problem. Social attitude toward the two sexes contributes to a heightened degree of emotionality in the female. It frowns, however, upon emotional behavior in the male. It is quite permissible, for instance, for a girl to cry upon various occasions, but for a man of her own age and class, it is taboo even at life's tragic moments. Under conditions of social approval and disapproval men and women undoubtedly become greatly diversified. As a result, any innate emotional differences between the sexes are obscured.

Since reliable experimental data upon the problem are so meager, we refer to certain other forms of evidence which have been advanced in an attempt to throw some light upon this problem. From the field of the abnormal we find some evidence bearing upon this matter. Women

are more strongly inclined to develop mental troubles of an emotional sort. A significantly larger percentage of women suffer disturbances of the manic-depressive type of insanity. On the other hand, when we turn to the problem of suicide, which is assumed to be intimately associated with emotional troubles, we discover that a great many more men than women commit suicide. It is estimated that approximately three times as many men as women commit suicide. From the data on emotional abnormalities, however, we should expect to find a larger number of women than men taking their own lives. It may be that women go crazy, but men commit suicide. Differences of another nature between the sexes in terms of suicide appear. Women, we are told, "commit suicide most frequently between the ages of twenty and forty, the period when love affairs are ending unhappily," while men commit suicide more frequently from forty to sixty, during the period when "business affairs and financial failures are most depressing" (*29*). From this some would infer that men are less disturbed by love than are women; men are, however, more upset by social and economic failures.

Thorndike insists that men are innately more pugnacious in their relations with others, while women are naturally inclined to nurse, to care for and fuss over, to relieve, to comfort, and to console others. Growth ordinarily serves mainly to sharpen these dissimilarities.

> Training undoubtedly accentuates these inborn differences since boys play more with boys and are trained more by men, the opposite holding with girls. A reversal of training by which girls would be surrounded by the social milieu now affecting boys would, as we often see in isolated cases, lessen the sex differences. But we may be sure that if we should keep the environment of boys and girls absolutely similar these instincts would produce sure and important differences between the mental and moral activities of boys and girls (*43*, 203).

One cannot prove or disprove the truth of such claims as these in favor of an instinctive basis for sex difference. There are certain lines of evidence, however, which tend to cast some doubt upon them. Women, for example, have been known to be as pugnacious as men in matters touching upon honor, home, and country. If the social code did not stand so firmly against fighting among women, we might find even more evidence of this sort. Under conditions which operate to "free" them from such restraints, women become pugnacious. They fight. They do not fight men, to be sure; they fight among themselves and, in some localities, more often than do men. We learn in this connection that more women than men from the New York slum districts are arraigned before judges under the charge of fighting.

No one questions, of course, that women serve admirably as nurses, consolers, comforters, and the like. We would not have it otherwise. But we must realize that they have been forced to do those things. And it is not necessary to seek the origin of such behavior in instincts of the sort assumed by Thorndike. We believe, on the contrary, that it is much nearer the truth to say that women learn to nurse, to care for, and to fuss over others. We believe that the male, given training, would be just as efficient as the female in caring for and fussing over others. Under the present arrangement of life affairs, however, he is not so desirable in such rôles.

Intelligence. The subject of sex differences in intelligence is of perennial interest. Very few of the great writers and thinkers have failed to express their opinions upon this topic. But very few of the earlier writers were troubled, we surmise, about the lack of a factual basis for their opinions. More recently men have sought to collect a body of reputable data upon which to base their generalities. Earlier, it was largely assumed that because women differ very obviously, both structurally and physiologically, from men they must likewise differ in intelligence. There are today men who point to structural differences between the sexes as a form of evidence lending support to their claims for intellectual dissimilarities. We are interested here in offering the results of a few of the many serious and careful attempts made during the more recent years to lay bare the intellectual capabilities of men and women. We offer these together with the warning that one must always bear in mind the fact that large differences unquestionably occur among members of the same sex. The student must also recognize that tests differ more or less in terms of the particular angle of attack upon the organism with a resultant difference in measurement or outcome.

Both the Army Alpha and Army Beta tests have been given to large numbers of men and women. These army tests appear to favor the men. From the results of such testing with groups of boys and girls of high school, Whipple, for one, is inclined to believe that we may safely assert that high school boys as a group are really slightly superior intellectually to high school girls as a group. On the other hand, Pressey concludes that "it seems fairly clear that on the usual scale for measuring 'general intelligence' girls average slightly better than boys." One of the more extensive studies of intelligence among members of both sexes was made by Boynton, who gave the Stanford Revision of the Binet test to 1,170 boys and 628 girls and the Army Alpha to 970 boys and 551 girls, all of whom were university students. No significant or

reliable differences between the *total* scores of males and the females appeared in the results from either test. "The most striking feature of the data," Boynton concludes, "is probably the overlapping of the scores of the two sexes, or the similarity of responses made by the two sexes, rather than the difference in the responses of the two sexes" (*3*, 625).

When the performances of males and females on various tests such as the Army Alpha or the Stanford Revision of the Binet test are carefully analyzed, it is found that the superiority of the male is manifested in such tasks as arithmetical reasoning, giving differences between a king and a president, in finding similarities, in reversing the hands of a clock, and in making change. The superiority of the female is shown in such tasks as drawing designs from memory, in esthetic comparisons, comparing objects from memory, in repeating digits and sentences, and in finding rhymes. While girls appear to form associations more quickly and to be superior particularly in those tests which involve general linguistic ability, boys seem to do significantly better in tests demanding a greater degree of originality.

Slight differences also appear between the sexes in terms of scholarship. Girls, on the whole, do better in school than boys. This holds not only for grade but for college subjects as well. Girls are intellectually superior in linguistic ability and in handwriting. It may be, as we have said, that these two factors alone determine their superior scholastic standing. At least it would appear quite unnecessary to assume a greater superiority of the female in intellectual abilities. Broadly speaking, we say that boys outrank the girls in mathematics and history. Girls forge ahead, however, in studies of a literary or linguistic nature. The following data (*43*) show the relative achievement of members of both sexes in high school and college subjects. These values are given in terms of the percentage of males reaching or exceeding the median of the females.

SCHOOL MARKS

High School Pupils

English	41
Mathematics	57
Latin	57
History	60

College Students

English	35
Mathematics	45
History and Economics	56
Natural Sciences	50
Modern Languages	40

Out of a total of five college subjects reported here we see the male exceeding the median of the female in one, equalling it in another, and dropping below it in three. In no case, however, is the difference extremely great.

The old notion of man's superiority in this field of higher education appears to lack factual foundation. We must agree with Thorndike that "the experiments of the last generation in educating women have shown their equal competence in school work of elementary, secondary and college grade." Long ago, when men were more certain about their superiority, a famous man remarked that a "woman's preaching is like a dog walking on its hind legs. We are not only surprised that she does it, but that she does it so well." If he were alive today, he might be even more surprised at woman's achievement in the field of education. Commenting on the point that girls at least do as well as men in university work, Woolley writes, "The fact is so well established in this country, that it has given rise to the witticism that university professors who used to object to admitting women to their classes on the ground that it would lower the standards of scholarship, now object because the women do so much better class work that the men become discouraged and refuse to compete in the game" (*48*, 364).

Variability. For a long time men have been assumed to be mentally more variable than women. By this is meant that the abilities of women, when represented on a normal distribution curve, cluster more closely around the mean; that is, the curve is not spread out so widely. On the other hand, the curve for men for the same ability is spread out more widely. The range for men is greater. Figure 37 represents the assumed mode of distribution of a given trait (in this case, color discrimination) for the two sexes.

In terms of this assumption, a greater number of men are supposed, for instance, to be more emotional and more intelligent and to have greater perceptual, memorial, and understanding abilities than women; and a greater number of men are assumed to be less emotional and less intelligent and to have poorer perceptual, memorial, and understanding abilities than women. Or to put it differently, it means that women in their emotional, perceptual, memorial, and understanding abilities do not differ from each other to the same degree that men differ from each other. Women are more alike, men are less alike in terms of any particular trait.

The origin of the argument over the greater variability of the male is to be attributed largely to those persons who sought to explain the greater number of men of genius by assuming that men, as a group, are

more *variable* than women. If men are more variable, it then follows that the genius—the rare individual—comes from the one or two per cent of the men who stand out over and above the most intelligent woman. The one or two (1 or 2 per cent) most intelligent women among a hundred in the population at large are not equal to the one or two most intelligent men in every one hundred of the population. Moreover, if

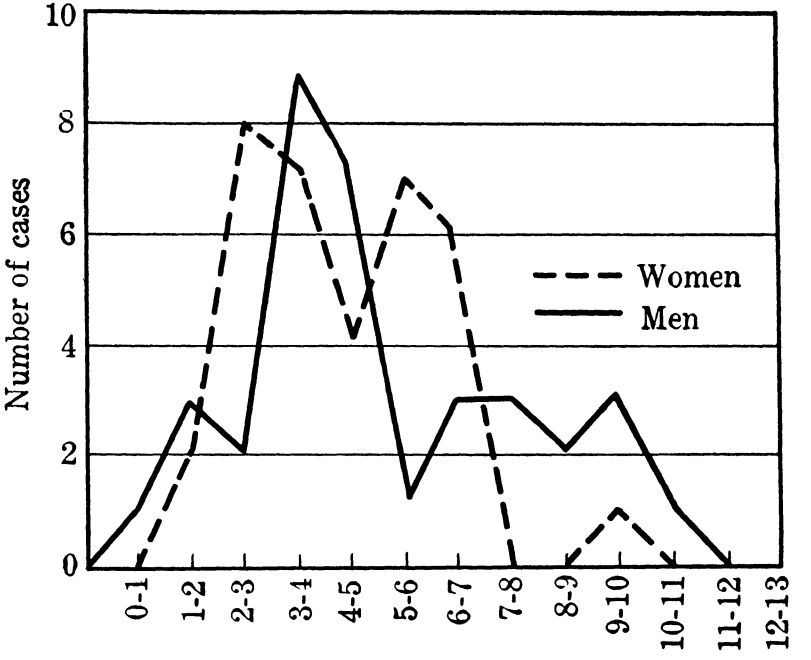


FIG. 37. Range of ability of men and women in color discrimination. From Henmon. After Starch, *Educational Psychology*. By permission of The Macmillan Company.

we take the upper fifteen per cent of a mixed population of males and females, we will find a greater number of men than women.

Do the facts at hand tend to substantiate the assumption that men tend to vary more widely than women from an average, with the result that more men are found in the ranks of the genius and the idiot? Let us take a moment for the evidence. We have been told that men vary more in physical traits than do women. We indicated earlier, however, that from careful *physical* measurements of 2,000 newborn babies (1,000 of each sex) Hollingworth and Montague failed to find any differences in the range of variability. Their conclusion is further supported by Pearson, who arrived at a like conclusion, from a study of the physical

traits of adults. While the above results do not prove that men are no more variable than women in physical traits, they tend to show that earlier assertions in this connection are somewhat questionable. The evidence concerning variability in psychological traits is somewhat contradictory and puzzling. Pyle found that boys are slightly more variable in learning capacity. In tapping tests, Wells reported that women are less variable in initial rate, slightly less variable in gross rate with increasing variability under fatigue. Ellis has maintained that women are "conservative," and that the variational tendency finds greater expression in men. In his tests, Terman apparently has been unable to find evidence of any supposed wider variation of intelligence among boys. In a study of incidental memory, Meyers found the males less variable than the females. Stewart, using more than a thousand students on tests involving the estimation of time, found little difference in the variability of men and women, but where variability was found, it was greater for women. Considering all the evidence, it would seem that the safest thing to say is that males have been found to be more variable in certain performances, while women have been found more variable in other types of performances. It may well be that there is no general sex difference in psychological variability.

Mental Deficiencies. Greater variability, we said, implies that there are more dullards among men. It also means that there are more cases of mental disturbance, an implication apparently borne out by the statistical evidence at hand. Men seem to "go crazy" in greater numbers than do women. Of course, this does not prove that there are inherent differences in variability between the sexes. It may mean simply that a greater number of men are thrown into closer contacts with the harsher conditions of life. They suffer a greater number of mental conflicts than do women and as a result break down in greater numbers. The following table shows some interesting facts concerning the two sexes in terms of first admission to institutions for the mentally incapacitated and the type of psychological disease or disturbance (*34*). These data covering 44,938 cases were taken from the records of 526 institutions. The rate is based upon 100,000 of the population of the same environment, sex, and age.

Except for the urban group, in which women exceed the men, the average rate of first admission is higher for men with senile psychosis. It is also higher for cerebral arteriosclerosis. In cities, about twice as many men as women are admitted for general paralysis, a mental disease in which a primary cause is syphilis. Alcoholic psychosis appears to be almost entirely a male disorder. A significantly large number of

TABLE XIII

AVERAGE RATE OF FIRST ADMISSION FOR MENTAL DISEASE IN THE U. S.—1922

MENTAL DISEASE	Number of Cases	Rural Women	Rural Men	Urban Women	Urban Men
Senile Psychoses	5927	20.3	23.1	34.3	29.4
Cerebral Arteriosclerosis	3006	6.3	12.4	13.6	21.1
General Paralysis	5515	1.3	5.1	4.4	18.3
Alcoholic Psychosis	2337	0.1	2.5	1.1	8.5
Dementia praecox	14031	11.7	14.9	21.6	29.9
Manic-Depressive	10028	14.6	11.2	18.2	11.8
Involutional Melancholia	1556	5.9	2.5	9.6	4.1
Psychoneurosis and Neurosis	2538	2.0	2.6	3.5	5.6

women are admitted for troubles of manic-depressive and melancholic nature. Men, on the other hand, suffer to a greater degree from such disturbances as dementia praecox, psychoneurosis, and neurosis. Taken all together the figures show, we may say, a greater average rate of first admission for men into institutions for the insane. We also find a greater number of males in institutions for such mental troubles as idiocy and imbecility—a fact which is of considerable interest. It has been cited repeatedly by various writers as a form of pathological evidence tending to show a greater degree of male variability. Not only are there more geniuses among the men; there are also more feebleminded. There are more male idiots. Concerning the disproportionate number of men who are deficient in general intelligence, Thorndike writes: "It is well known that very marked intellectual weakness is commoner amongst men than amongst women. Two times as many men as women will be found in asylums for idiots and imbeciles; and one and a third times as many will be found by a census including those cases (commonly somewhat less stupid) cared for at home" (*43*, 189). If we deny a greater degree of male variability as an explanation of the greater number of feebleminded men in our institutions for defectives, have we another way of understanding them?

Hollingworth studied 1,000 subnormal individuals who passed through a clearing house[1] for mental defectives, of whom 568 were males, and 432 were females. Of the individuals *over 16 years of age* there were 78 males and 159 females; of individuals over 30 years there were 9 males and 28 females. For these years the number of females greatly exceeded the males. But for the ages up to 16 years, the frequency for males was very much greater than for females. Her im-

[1] Post Graduate Hospital in New York City.

pression is that a female with a mental age of 6 years survives in the social milieu about as well as does a male with a mental age of 10 or 11 years (*20*, 755). Hollingworth believes that any defective male is much more certain to be picked up and brought to the clearing house than is a female of the same degree of defectiveness. The girls, however, survive either through house work or prostitution until some mishap out of the ordinary brings them into an institution. Hollingworth holds that "women are a dependent and non-competitive class, and when defective can more easily survive outside institutions, since they do not compete mentally with normal individuals, as men do, to maintain themselves in a social milieu." With increasing age (over 30) their chances for survival are somewhat lessened. As a result more than three times as many women as men were brought in at this period. The difference in number of sexes segregated in institutions for the feeble-minded is to be explained in terms of a difference in the way in which selective factors, which are largely social in nature, operate upon male and female defectives. It may be true, as Hollingworth points out, that "if our social habit and organization ever change so that sex as such is no longer of commercial and economic value to women, and so that women become mentally competitive to the same extent as men, the number of females in institutions for the feebleminded will be materially increased" (*20*, 756).

Greatness in Men and Women. A form of evidence cited by many in favor of a greater variability in the male consists in the striking difference between the sexes in terms of the relatively greater number of men who have achieved greatness. An examination of the lists of great personages reveals the names of very few women. In an investigation of British genius, Ellis, for example, lists a wholly disproportionately small number of women. Among 975 individuals of a high degree of intellectual achievement, the eminent women number only 55, a ratio of about 1 to 18. Cattell selected 1,000 individuals most worthy in his estimation of being placed in a list of the truly great. Among these, the names of only thirty-two women occur. Eleven of these owe their greatness to the chances that made them sovereigns, while eight of the thirty-two are listed because of *beauty* and *misfortune*! "*Belles-lettres* and fiction—the only department in which woman has accomplished much—give ten names compared with seventy-two men" (*6*, 375).

Attempts to explain this striking difference in achievement between the sexes bring many answers. As we have said, the commonest explanation is that woman is less variable. Cattell thus writes: "Women depart less from the normal than men—a fact that usually holds for the

female throughout the animal series." Others say that women have failed to attain eminence, not because she is less variable but because she has been denied the same advantages of education enjoyed by males. Because of a lack of education, those many fields in which she might have attained eminence have been closed to her, while such fields as capability in motherhood, dish-washing, general domestic labor, and prostitution, which are open to her, have never been honored with the title "eminent." Moreover, far more women have married than have remained unmarried. And there is no reason to doubt that *married* women who embark upon a professional career expend in bearing and rearing children a great deal of the vital energy which would otherwise have gone toward making them eminent in some field. It is also possible, of course, that in terms of her emotional life woman is neither inclined toward nor fitted for those many fields in which eminence can be attained. If she is truly more emotional than the male, her possibilities must suffer a serious limitation in those fields in which she has to compete with men less handicapped by emotionality. Other explanations of the differences in achievement between the sexes have been given, but we cannot consider them.

In the past, more men than women have unquestionably been eminent, but what of the future? If we should agree that women lack only an opportunity—the same opportunity for education and the same degree of freedom from social restraint enjoyed by the men—have we any evidence for believing that they will do things when given equal opportunities? Castle has given us some very interesting material upon this problem (Table XIV). She has listed century by century the names of those women whom she believes to have achieved greatness. Of a total of 868, approximately 40% belong to the 19th Century. Of the total number of eminent women found during a period of twenty-five centuries, more than 12% were living in 1913. As Castle remarks, "12.3 per cent of the eminent women of history are living at the time this study is made. It required over twenty-five hundred years to produce the remaining 87.7 per cent."

Table XV, showing the distribution of eminent women by occupation, makes clear the relatively narrow range of occupations previously invaded by women. Years ago her chances for eminence lay largely through writing or marriage—the ways to medicine, to law, to industry, to science, and to other fields were barred to her.

The greater freedom of the present century, however, is rapidly pushing woman to the front. We recognize that the World War served indirectly to aid tremendously the cause of women. It opened fields no one thought her capable of invading. Once in, to man's surprise,

TABLE XIV

DISTRIBUTION OF EMINENT WOMEN BY CENTURIES

Century	Number of Cases	Century	Number of Cases
7 B.C.	3	7	7
6	3	8	5
5	8	9	6
4	8	10	6
3	4	11	9
2	1	12	12
1	10	13	10
A.D. 1	11	14	17
2	4	15	32
3	14	16	45
4	6	17	84
5	7	18	213
6	8	19	333
		Total	868

she did extraordinarily well; and she has struggled valiantly to remain and to achieve. But she unquestionably labors under terrific odds. The chances are mainly against her. Thomas expresses the state of affairs quite well:

Even the most serious-minded women of the present day stand, in any work they undertake, in precisely the same relation to men that the amateur stands to the professional in games. They may be desperately interested and may work to the limit of endurance at times; but, like the amateur, they got into the game late, and have not had a lifetime of practice, or they do not have the advantage of that pace gained only by competing incessantly with players of the first rank (*40*).

TABLE XV

DISTRIBUTION OF EMINENT WOMEN BY OCCUPATION

	Cases		Cases
Literature	337	Reformer	9
Marriage	84	Dancer	6
Religion	64	Immortalized in Literature	6
Sovereign	59	Patron of Learning	6
Actress	56	Beauty	6
Music	49	Educator	3
Birth	39	Revolutionist	2
Mistress	29	Misfortune	2
Scholar	20	Traveler	2
Political Influence	19	Adventuress	2
Artist	17	Physician	2
Philanthropy	12	Fortune Teller	1
Tragic Fate	11	Criminal	1
Heroine	10	Conjugal Devotion	1
Motherhood	10		
		Total	868

in the learning process, these laws lose much of their former importance. The core of the learning process becomes not habit but intelligence; not trial-and-error but an understanding of the relations of things. It is as yet an open question as to how much habit and how much insight we can safely admit into our descriptions of learned behavior. Up to now the major concern of *Gestalt* psychology with the problem of learning has been mainly descriptive in intent, with less emphasis upon explanation. Its educational implications, while interesting, must await seasoning before a thoroughly sensible evaluation of them can be made.

Historically, learning was long described as a form of mental activity, a fact of behavior, or observable conduct. Can it be described in physiological terms? Most explanations which have been offered concerning this problem generally involve two assumptions. The first is that of a universally interconnected neural system. Herrick writes, "In higher vertebrates all parts of the nervous system are bound together by connective paths." Ladd affirms that in his opinion "potentially at least paths exist from each receptor to every effector unit." Sherrington remarks, "Each final common path is in connection with practically each one of all the receptors of the body."

The second assumption concerns the matter of differential resistance at the synapse. Through heredity the resistance of some synapses is high, while that of others is low. The organism is thus innately endowed with certain specific behavior patterns. Upon these high and low resistances, determined through heredity, are fashioned the acquired patterns of the individual. The particular character of the pattern is determined partly by the potentialities of the nervous system in terms of resistance and partly by the chance character of the environment. The resistance may be changed through a piling up of neural impulses from many directions, so that passage across the synapse is brought about; by continued repetition; by fatigue; by drugs, and so on. The use of a drug, for instance, may permanently lower some and permanently raise the resistance of other synapses. The drug addict appears. Here is the environment at work determining the resistance at the synapse.

Despite the vast amount of labor which has gone into investigation f the physiological nature of learning we know very little about the undamental mechanism involved. Lashley, who perhaps above all thers has made noteworthy contributions to this particular problem oubts "that we know anything more about the mechanism of learning ıan did Descartes." He does find, however, that the results of current vestigations upon the problem of the physiological basis of learning

apparently stand opposed to any conception of learning in terms of definite reflex arcs. The theory of simple conditioning is apparently too simple to do justice to the facts. We are, then, still lacking an adequate theory of learning, because we are still lacking an extensive factual foundation for such a theory. In Lashley's opinion, "descriptive studies of learning must be extended over a far wider range and in much greater detail than at present, and must reveal the similarities and differences between the many types and levels of modification of behavior before any attempt to formulate a general theory of learning will be of any value" (*25*, 562).

Conventional laws of learning which derive historically from the laws of association, and which seek to define conditions under which learning occurs have served as points of departure in the past for theories as to the nature of the process. These laws have long been recognized as being descriptive rather than explanatory. Recent experimental investigations have shown that they are not even infallible as descriptions of the process of learning. Their historical importance, however, entitles them to brief mention at this point.

Laws of Learning. The Law of Contiguity may be considered as fundamental; it is, perhaps, the most clearly established of these laws. It defines essentially one condition of the learning process which may be stated in this way: "Experiences which have been registered together become associated and tend afterward to persist in the original relations" (*3*, 359).

The Law of Exercise or Use has been much stressed. Lashley has pointed out, however, that its universality and fundamental importance are questionable. Much human learning, for instance, does not involve repetition. This is even true of animals. Morgan cites the case of the chick that, after one experience, steadily refused a "distasteful" cinnebar caterpillar. Many habits, moreover, are so complex that improvement involves not so much a strengthening of old associations as the establishing of new ones. Finally, the phenomenon of "going stale" over practice shows that repetition may actually weaken associations. Physiologically, this law of exercise, use, frequency, repetition—as it has been variously called—reduces to the theory that repeated transmission of neural impulses over certain particular synapses tends to lower their threshold, or to reduce their resistance. Lashley, however, remarks that even though associative connections may be strengthened by practice, it does not necessarily follow that these connections are nerve tracts in which resistance is lowered by the repeated passage of impulses.

Whatever the criticisms brought against the law of use, it has proved

to have practical application in the school room. The dogma "practice makes perfect" has not been accepted uncritically, however, as is attested to by the fact that educators repeatedly point out that in order to be most effective, repetitions must be accompanied by attention. They must be distributed according to difficulty; the individual must be motivated, and the errors must be corrected as they are discovered. Some of these factors in the efficacy of repetition will receive attention in a later part of this chapter.

Good teachers have always realized that even in those exercises which lend themselves most easily to methods of "drill" or practice, some other factor besides repetition seems to be necessary. The student must "will to learn," and he must be interested in the task. The Law of Effect has been proposed to account for this additional element. Pleasure is said to "stamp in" the successful reaction, and displeasure to "stamp out" unsuccessful responses. Here is the pleasure-pain theory. Lashley, in a criticism of this explanation of learning, points out that it fails to account for the acquisition of both likes and dislikes as well as the fact that the unpleasant experience may be recalled as readily as the pleasant.

Studies upon the relation of strength of incentives such as hunger, sex, punishment, to the rate of learning show that these so-called "drives" actually play an important part in certain types of learning. Whether this is due to an increase of activity which tends to expand the effective environment, to increased intensity of the effects of associated stimuli, or to some specific action whereby associations are fixed is not known.

Stated as a general principle of motivation the law of effect is no doubt of considerable significance. All learning rests upon motivation either positive or negative. The whole matter of rewards and punishments is of great importance to education and to society at large. The technique of teaching can no longer assume that the pupil is a learner, and then proceed to concern itself only with what is to be presented to the pupil. As was said above, good teaching presupposes an intent to learn on the part of the pupil. He must be interested by an exploitation of interests already at work in his behavior, be they native or acquired, if desirable results are to appear.

There have been attempts to demonstrate that the primacy and recency of an element in learning may operate independently of each other and of any other factors to influence the learning process. Jersild recently secured data on the relative strength of primacy, recency, frequency, and vividness as these operated collectively upon narrative material consisting of seventy distinct statements of fact each of which

could be separately scored on a test for immediate recall. These facts related to a biographical account of a fictitious character and were presented vocally. Of his results Jersild remarks:

> (1) Added frequency increases the effectiveness of recall; but not in direct proportion to the number of repetitions. . . . (2) Distinct evidence is found for the superiority of distributed as compared with concentrated repetition. . . . (3) Of all the devices here under investigation primacy stands out as prepotent. . . . (4) All the vividness devices used in the study ("Now get this," "Did you notice that?" loudness, gesture, bang, pause) were positive aids to recall except that of speaking very slowly. . . . (5) The lower the memorial value of a given item, the greater the relative benefit effected by increased repetition (*20*).

On the whole, it is probable that primacy and recency are effective only when they increase the intensity or the vividness of the situation.

The Law of Intensity or Vividness seems to apply almost as widely as contiguity as a condition favoring the learning process. Intensity or vividness sometimes does away with the need for repetition even in learning of the habit-formation type. Every teacher knows that a single attentive reaction on the part of a child means more in acquisition and subsequent recall than a number of perfunctory reactions. It would seem that if every school experience could be made sufficiently vivid, there would be less need for repetition.

Factors and Conditions in Learning. The degree and rate of learning vary with a number of conditions. Learning changes with a variation in the stimulating conditions such as the frequency of experiencing, the method of presentation (part *vs.* whole) and amount. Moreover, variations in the conditions of the subject such as fatigue, age, sex, cultural status, incentive, neural condition as well as the character, amount, and recency of past training exert a profound effect upon acquisition. For purposes mainly of discussion, these two large sets of factors may be grouped under such heads as external, physiological, psychological, and educational conditions affecting acquisition.

External conditions affecting class room learning include such factors as light, temperature, air, cleanliness; kinds of materials used—paper, chalk, size of print; distractions, the time of day, and even the teacher's voice might be included in this list. It is not within the scope of this chapter to consider these, but it might be pointed out that many misconceptions as to the influence of such factors on the efficiency of learning, colored pedagogical procedure previous to the ascertaining of the true state of affairs through experimental investigation. We point to the studies made by Thorndike and others in which it was shown

that adult subjects when urged to do their best could perform quite well and improved as much when working in hot, humid, stale and stagnant air (temperature 86 degrees Fahrenheit, humidity 80%, with no fresh air and no movement in the air) as when they were working under optimum conditions—namely, a temperature of 68 degrees Fahrenheit, 50% relative humidity, and 45 cubic feet of outside air per minute for each person. What the effects would be on the health and emotional attitude of the individual, toward learning carried on under such undesirable external conditions as the above, we do not know. We can only conclude that people can, at least for relatively short periods of time, learn as well under uncomfortable as under comfortable external conditions.

Physiological factors include bodily fatigue, amount of sleep, age, sex, neural conditions, and the health of the individual. Since the general effects of some of these factors upon the psychological functions have for the most part received attention in other chapters, we shall not consider them here.

By psychological factors are usually meant such conditions as the motives, abilities, and cultural status of the individual; his temporary and permanent emotional states; and the character, amount, and recency of his earlier training.

Under educational factors there might be considered all the variations in the stimulating conditions, the external incentives used, the effects of transfer, and the personality of the teacher.

It will be recognized that these groups are arbitrary, overlapping, and are used purely for the sake of convenience. In this chapter we shall not attempt to discuss them under these categories, but shall deal with certain of them as they may arise under the special modes of learning.

THE PROBLEM OF ECONOMICAL LEARNING

Much school learning involves the acquisition of arbitrary associations such as the sequence of letters in spelling, number facts in arithmetic, and the recognition of words in silent reading. Acquisition of the logical type is to be found in learning prose and poetry, parts in a play, *etc.* The question of economy in learning must frequently be answered differently depending on whether rote or logical learning is involved. In most cases, whether the associations are arbitrary or whether they are meaningful, some repetition is usually necessary to insure retention and subsequent recall.

Ebbinghaus was the first to investigate the factors which help and

hinder learning. His methodology was so excellent that his findings have for the most part been verified by later workers in the same field. Many of his studies were in the field of rote learning, in which he employed material of the "nonsense" sort and determined the degree of *retention* by the so-called *savings method* in which the number of repetitions required for one successful reproduction is compared with the number of repetitions required to re-learn following a given interval.

Distributed *vs.* Massed Practice. Here we have the problem of the influence, upon the rate of learning and the degree of retention, of periods of rest introduced between successive periods of practice. Ebbinghaus, using lists of nonsense syllables, found that 37.9 repetitions distributed over three days gave essentially the same retention after twenty-four hours as 68.3 repetitions in immediate succession. Cummins' work, too, indicates the desirability of using short rest periods during the initial stages and progressively longer intervals between the final stages of learning. Experimental findings in general indicate that within limits learning is accomplished with less work when practice is distributed than when it is concentrated. Less diversity of performance, fatigue, and loss of interest in long practice periods are probably responsible for the differences.

The greater efficiency of spaced practice is one of the reasons why "cramming" is looked upon as a bad procedure where permanent retention is desired. It is also involved in the question of whether it is more advisable for high school and college classes to meet a large number of times per week over one semester, or a fewer number of times per week over two or more semesters. The problem of the most desirable length of study and recitation periods is also a case in point here.

The Part and the Whole Methods of Learning. In 1900, Miss Steffens pointed out that it is more efficient to learn material (selected stanzas from Byron's *Childe Harold*) as a whole than it is to learn it in parts. Similar but smaller differences were also shown for the learning of long lists of nonsense syllables. This economy holds for both initial learning and subsequent retention and recall. Pyle and Snyder, experimenting with sections of Longfellow's translation of the *Divine Comedy*, found a saving, measured in terms of the number of repetitions required for learning, which ranged from 11% in short units (20–50 line units) to 20% for longer units (60–240 line units). These results were later verified by Lakenan. Somewhat contradictory evidence has appeared, however, in the work of Winch, Pechstein, and Reed. Some of the results of the studies of these three indicate that a modification of the whole method may be advisable in some instances, depending, for ex-

ample, upon the character of the material learned, the individual, and his previous training.

One reason for the apparent advantage of the whole method probably lies in the fact that material learned as a whole is more likely to assume a meaningful rather than a non-meaningful tone. The individual gets the entire picture in the one case, but a broken, piecemeal effect in the other. Another reason lies in the "derailing" effects of learning in sections. This derailing apparently results from the formation of verbal patterns between the *last* and the *first* words of a particular section rather than between the last words of one, and the first words of a succeeding section. When such patterns exist, the individual at the end of a section finds himself back at the start. He cannot successfully negotiate the "gap" between sections.

Passive and Active Recall. In actual school practice, passive and active recall is usually referred to as reading and recitation. Reading indicates recall with some stimulus (passive), and recitation means recall without stimulus (active). Witasek tried out twelve combinations of readings and prompted recitations of series of nonsense syllables. He found the most economical of his combinations to be six readings plus fifteen recitations. Gates has recently investigated this problem using large numbers of school children and a few adults. His material consisted of nonsense syllables and consecutive verbal material patterned after the biographical sketches in *Who's Who*. He utilized various combinations of recitation and reading in grades 4, 5, 6, and 8. His results indicate that efficiency of recall for all four school grades increases to a certain point with the increase in amount of recitation and then declines. He found that recitation inserted early in the learning period was most significant. The advantage of an active over a passive attitude probably lies in the fact that the former allows for the correction of errors and affords practice in the type of recall which the student will ultimately be required to make. The pedagogical value of outlines, summarizing paragraphs in a single sentence, study questions, and the like probably derives from this factor in learning.

Importance of Motive and Attitude. The importance of the attitude of the learner in the learning process has been referred to again and again. Book, using two groups of subjects, one as a motivated, the other as a control group with their rôles reversed while the experiment was in progress, obtained the results shown in Figure 36. The motivated groups in all experiments made rapid and continuous progress in amount and accuracy, which is to be contrasted with the achievement of these same subjects when acting as control groups on the same tests.

Book encouraged his groups to develop interest and to strive to improve upon their performances by having them count and record their own scores, by constantly assuring them of the possibility of their improvement, and by instructing them to watch for anything that might favorably influence their learning. Here was a direct appeal to the

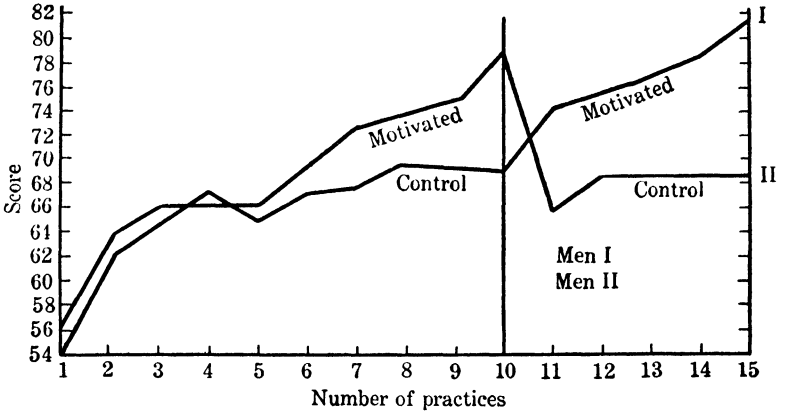


FIG. 38. Comparison of the performances of motivated and unmotivated groups in writing. When the motivated group becomes the control or unmotivated group, the curve immediately drops. When the control group becomes motivated, the curve rises rapidly.

interests and the emotions. The outcome indicates roughly the part which such factors play in determining improvement.

The emotional and attentional aspects of the learner's attitude should receive particular attention in school room practice. It is undoubtedly more efficient to repeat a few times with much interest or attention than to repeat a great many times with little or no interest. Appeals to intrinsic worth of the subject matter, games, trying to beat one's own record are only a few of the tricks up the pedagogical sleeve in this instance. Some, but not too much, emotional excitement of the pleasant variety seems to exercise a favorable influence upon most individuals in performances of this nature. It serves to key them; to release more energy.

Influence of the Group on the Learning Process. In the class room where learning must be carried on in the presence of others, it is quite important to know whether an individual is helped or hindered by his working in the group. In all such cases, either the quality and the quantity of the work or both may be affected.

Allport carried on a series of experiments in the Psychological

Laboratory at Harvard to determine the effects of the presence of a co-working group.[1] He found that "for mental work involving close attention: (1) most individuals work at higher speed when stimulated by co-workers, (2) a few individuals are retarded by social influence, (3) the advantage for quality of performance seems to be upon the side of the solitary condition" (*1*, 267). Allport also found a social subvaluent for argumentative reasoning. In judgment, he found a tendency toward moderation made in judgments in concert with others, the individual apparently tending to avoid extreme judgments which he does not hesitate to make when alone.

Effects of Age upon Learning. The hypothesis that the plasticity of the nervous system varies with age is embodied in the maxim, "You can't teach an old dog new tricks." A good deal of confused thinking and uncritical acceptance of untested opinion has marked discussions of this question. Let us examine some of the more authoritative opinions and the experimental data upon the subject.

Thorndike, in a study of adult learning, came to the following conclusions: "(1) There is a general inferiority of about 15% from the age of twenty on. (2) Inferiority is greater for material depending upon mere modifiability of the nervous tissue. (3) Material depending upon past experience shows even less inferiority" (*38*, 104).

There are several reasons why the adult or mature learner might be expected to learn with greater efficiency than the young. The former is able, for example, to control and sustain his activity for longer periods than the young learner. He is not so easily diverted; neither does he break down nor give up so quickly. Moreover, he is better able to direct his attention and hold it voluntarily at a high level. He has a wider background upon which to draw in order to maintain an attentive set. He can think more widely about objects and topics, and in this way strengthen flagging interest. Furthermore, he has a wider range of motives that may be appealed to. The child has few reasons for doing anything. On the other hand, the adult, when inclined, is decidedly clever at finding reasons for continuing some activity. If one reason fails, others are quickly discovered. Finally, he has an increased store of experience, information, and facts with which to attack and assimilate new material. The child has few tools with which to work, and it is inexpert in their use. The adult has a fund of knowledge upon

[1] Allport uses the term social increment and social decrement to denote a respective gain or loss in the quantity of work done in the group; and the terms social supervaluent and subvaluent for corresponding gains or losses in the quality of work done.

which to draw. Because he has had experience, he is better able to cope with new situations. He may have "made a rule" never to give up quickly but, when hard pressed, to exhaust every possible resource before admitting defeat. Not infrequently, as we will know, success in meeting situations depends to no small degree upon the individual's determination to stick it out. Such strong attitudes come as a product of maturity.

Within the school learning period (3 to 20 years) learning seems to show a negatively accelerated curve rising rapidly from the age of three to fifteen or sixteen then slowing up and levelling off at about the

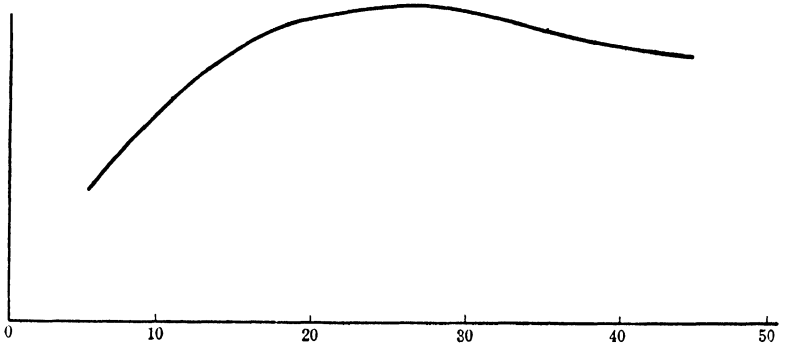


FIG. 39. General form of the curve of ability to learn in relation to age. The curve levels off around the age of twenty and then, after a time, starts to decline. From Thorndike, *Adult Learning*. By permission of The Macmillan Company.

age of twenty. At the age of twenty, however, one is much better off than at any earlier point—apparently at least twice as well off as he was at the age of three. Adults, however, are frequently afraid of appearing to a disadvantage in certain social situations such as dancing, skating, chess playing, and the like, and often refuse to exert the effort necessary to acquire such forms of behavior. In experimental studies it is often difficult to interest the older individual to a degree sufficient to engage his full coöperation. Furthermore, the effects of old ways of doing things and established modes of feeling and thinking may inhibit the acquisition of new modes of response. Failure to learn may not be a matter of intrinsic neural changes; that is, changes in plasticity. It is probably significant, however, that the greatest inferiority in adult learning comes in activities where it would seem sheer modifiability is unaided by past experience—activities, that is, in which capacity to learn is relatively unaffected by previous acquisition in the form of knowledge, skill, or methods of attack. It will be seen in Table XVII,

for instance, that the greatest differences between the learning of young people and of older adults come for the most part in the mastery of the forms of learning which in this group depend least, it would seem, upon past experience.

SOME CONDITIONS WHICH AFFECT RETENTION OF LEARNED MATERIAL

Once a thing has been learned or acquired, what about its permanence? Forgetting is common enough, but what are the processes and factors involved? We must depend here upon the evidence from experimentation. For example, Ebbinghaus and Radossawljewitsch, working with nonsense syllables found that forgetting occurred in a definitely measurable way, as shown in Figure 40.

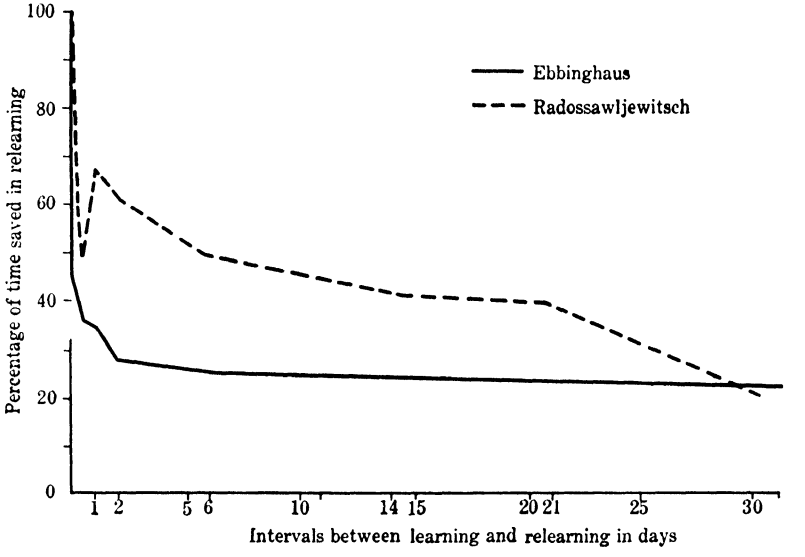


FIG. 40. Curves of forgetting of nonsense syllables measured in terms of the time saved in relearning.

Here we find two slightly different curves; the only difference in procedure being that Radossawljewitsch carried original learning to two successful reproductions where Ebbinghaus carried it to only one. In general, we can say that there apparently is no one curve of retention or forgetting, but instead many curves each of which varies from the other with a variation in the degree of mastery, in the character of the material, in the spread of initial learning, and in the amount and the character of the material which comes between periods of learning.

TABLE XVII

SUMMARY OF THE RELATION OF AGE TO ABILITY TO LEARN ACCORDING TO ACTIVITY CONCERNED (*38*, 103)

ACTIVITY	GAIN IN SCORE			PER CENT WHICH OLD IS OF YOUNG
	Young		Old	
	20–24 yrs.	25–34 yrs.	35 yrs. or over	
1. Drawing lines	....	....	....	64
2. Wrong-hand writing	57	51	41	72
3. Substitution (transcribing words)	28.0	27.9	22.8	81
4. Learn code	10.4	8.3	6.3	61
5. Esperanto	31.5	26.3	24.7	79
6. Learning number to fit nonsense syllables	21.9	18.2	14.0	64
7. University studies	....	....	....	over 100

Degree of Mastery. The serviceability of acquired materials seems to depend upon the degree to which they have been learned. We do not forget how to swim, jump, speak English, say the alphabet, or perform the simpler arithmetic computations. These things have been repeated so many thousands of times that they are greatly overlearned. We recognize in this connection that the rate of forgetting is inversely related to the degree of mastery or of overlearning. This fact, however, holds less value than we might suppose, for there is a sensible limit under usual conditions to such overlearning. It does not seem desirable in ordinary cases of learning to establish a high degree of overlearning. From the results of his studies in this particular field, Krueger reports that "a certain degree of overlearning, at least 50%, is highly economical from the standpoint of retention for intervals of 2–28 days, and the larger the interval the greater is the economy. Further increases of overlearning, however, prove to be uneconomical for most intervals" (*23*, 78).

Character of the Material. It has been widely held that verbal patterns are less well retained than non-verbal patterns; that is, the more implicit connections, particularly those of the verbal type called "information," are the hardest to retain and reproduce. McGeoch and Melton (*27*, 144) present evidence, however, that, other things being equal, these two types of responses learned to the same degree of proficiency or mastery would be equally well retained.

Spread of Initial Learning. To James we owe the well-known statement that we learn to skate in the summer and to swim in the winter. He was referring here to the commonly observed fact that not infre-

quently a function shows improvement following a period of no practice. Ballard called this phenomenon "reminiscence." The evidence presented indicates that the age of the learner seems to be an important factor in such matters. Reminiscence appears to be greatest with young and defective children, possibly dropping out at adolescence. It is most pronounced with meaningful material, and of necessity occurs only with incomplete or partial learning, for where full or complete acquisition occurs, there could be no improvement. No explanation has so far been offered to account adequately for this phenomenon. Dashiell ventures that in reminiscence we may not be dealing with a phenomenon of learning and retention at all, but with a phenomenon of working efficiency. In such cases, the causal factors might be such as fatigue, loss of interest, or other emotional attitudes as worry and impatience.

Amount and Character of Interpolated Material. An important phase of the major problem of retention is concerned with the effect of the things done between the time of acquisition of material and the recall of it. Put in the form of a question, this problem might be expressed in this manner: "Is the loss of retention under disuse due wholly to a decay of neural changes because of mere lapse of time or is it due partly at least to the disrupting influence of subsequent activities—that is, interpolated material?" This question has been attacked in a rather novel manner. Jenkins and Dallenbach used sleep for interpolated periods of 1-2-4-8 hours. They then compared their results in such cases with interpolations of 1-2-4-8 hours of ordinary waking activity. Their conclusion is that interpolated material blocks recall; that is, forgetting is not so much a matter of the actual decay of impressions as of interference, inhibition, or obliteration of the old by the more newly acquired.

Some of the conditions which contribute to this kind of forgetting (which is commonly known as retroactive inhibition) are the degree of learning, the amount of similarity between original learning and the interpolated work, and the time at which the material is interpolated.

It has been found that retroactive inhibition is less effective for overlearned than for partially learned material. Again, experimental results indicate that, at least within limits, retroactive inhibition decreases as similarity between original learning and interpolated activity increases when measured by the savings method. Skaggs (*36*, 32) and Robinson (*33*, 312) have suggested that the retroactive effect might be expected at first to increase then to decrease as the two activities vary from the maximum of difference to complete identity. Finally, it has been shown

that retroactive inhibition is greater when interpolated activity is put immediately after learning or immediately before recall.

Changed Environment. A factor of importance in determining the rate and the degree of forgetting is the influence of change in environmental relations. When a student learns, he may actually learn the whole surrounding environment. At a later time, when these "supporting" stimuli are absent, the learning may break down. For this reason students sometimes object to taking an examination in a room or in a seat other than the one used in study or recitation. This factor is also the basis for the dicta, "Practice where you are going to perform," and "Study the way you expect to recite."

Speed of Learning and Retention. A general belief in compensation rather than correlation among mental traits gave rise to the once accepted educational maxims—"A quick learner makes a quick forgetter," or "Easy come, easy go." Experimental results indicate, however, that individuals who learn most rapidly also make the best records in retention tests. They are not only more easily modified, but they are more tenacious. Their nervous systems are, so to speak, at once wax and iron. In a study[1] of this problem Woodworth used Italian-English vocabularies as the material to be learned. Italian-English combinations were learned to the point of one correct recall and immediately dropped from the list to prevent overlearning. Training was continued with remaining pairs until the entire 20 word list was learned, when the entire list was presented once. After intervals ranging from two to twenty hours, the Italian words were presented singly and the recall scores for the corresponding English words were determined. The results are shown in Table XVIII.

TABLE XVIII

RELATION BETWEEN SPEED OF LEARNING AND AMOUNT OF RETENTION OF ITALIAN-ENGLISH VOCABULARY

Number of repetitions required for learning	Per cent retained
1	73
2	72
3	63
4	58
5	38
6–11	27

[1] *Psychol. Bull.*, 1914, *11*, 58–59.

Dashiell, too, points out that "differences between two people in the efficiency and speed with which they acquire tend to remain as differences in their efficiency in retaining and recalling" (*10*, 367).

Does total forgetting ever occur? This question is of great popular interest, and while it is probable that the question must forever remain "academic," evidence against complete forgetting seems to come from many directions. The accelerated (quick) form of curves for the reacquiring of old habits is a case in point. Again, we know that old training sometimes helps in learning new tasks. Moreover, there are the striking cases of reproduction under unusual physical and mental conditions. Coleridge reports the case of a German girl who under delirium reproduced phrases from the Latin and the Greek. Such behavior was especially interesting because the girl was quite illiterate. An examination of her history revealed, however, that she had served as a maid for a man who, as he walked to and fro along a passage way from which a door opened into the kitchen, would frequently quote passages in these languages. The girl presumably heard—her nervous system "heard"—and later under the rapid deterioration of her brain in delirium she reproduced these earlier impressions. Psychoanalysis, moreover, has shown the possibility of a more extensive reproduction of earlier experiences than was formerly held possible. Under skillful probing, the psychoanalysist has been able, for instance, to uncover previous events in the life of an individual which were otherwise completely hidden.

By way of illustrating this tenacious tendency on the part of the nervous system to hold its impressions, James mentions the drunken Rip Van Winkle (portrayed by Joseph Jefferson) who in his lapses from grace always said, "Well, we won't count this time." "Maybe he won't count it," James writes, "and maybe a good God in Heaven won't count it, but the cells of his nervous system are counting it."

It may be theoretically claimed that the very fact that one is able to acquire at all is, at the same time, evidence that one cannot completely forget—the modifications induced in the nervous system through functioning actually represent a very essential characteristic of it. The changes written in it constitute its history. In order to believe in complete forgetting we are then forced to assume the operation of an "obliterative" tendency in the nervous system—a tendency which seeks to reduce the nervous system to a state of strict neutrality. The evidence at hand does not warrant such an assumption. We are left with the position that we probably never "recover" from the modification induced in us through functioning. The poet was near this truth when he wrote, "I am a part of all I have experienced."

Relation of Initial and Final Abilities. Another question of great educational and social significance concerns the relation between initial and final abilities. "What effect does training have finally upon those differences among individuals which are revealed during initial periods of the learning process?" "Do these differences increase, decrease, or remain the same?" From what we know of the effects of learning we should assume that such differences among learners would increase rather than diminish with long training. But certain difficulties such as determining a true zero, weighing units of a score in terms of their difficulty, and the use of adequate incentives especially in the final stages of learning have complicated the problem and at times prevented the formulation of clean-cut generalizations.

Goodenough and Brian, in a study of the factors underlying the acquisition of motor skills by twenty preschool children, found practically no relationship between initial status and gain; that is to say, those who did well in the beginning did not necessarily do so well, comparatively speaking, at the end. And those who made a poorer showing in the beginning occasionally did better at the end. There seemed to be no correlation between an individual's ability at the beginning of a training series and his ability at the end.

The Transfer of Training. Closely related to the question of "Can a thing be completely forgotten?" is the problem of what effect training in one line will have upon training along another line. Historically, this problem has had a real "past" and has been and still is of tremendous educational significance. In its classical interpretation it was probably first formulated by Plato and substantiated by the faculty psychology of Aristotle. The Schoolmen of medieval times made much of the disciplinary value of the Latin and the Greek in training the mind. Through a study of these, the mind was assumed to be hardened in much the same way that muscles are hardened; *i.e.*, made more capable of doing any sort of work. In more modern times the doctrine of formal discipline (as it is frequently called) is usually credited to John Locke, who applied it to all aspects of life—mental, moral, and physical.

In a somewhat extreme form this theory of mental discipline may be stated as follows: Certain studies because of their content, form, method, and procedure lend themselves so well to the formation of certain generalized intellectual powers that they are deserving of an important place in the curriculum although they may make no direct and obvious contribution to the social needs of the individual.

This theory so simplifies the function of education and the problems of curriculum construction, that it is no wonder it held a tenacious grip on educational thinking even after the old faculty psychology upon

which it was based had been found untenable. In fact, it was the doctrine almost universally held until Thorndike, in 1903, called attention to some early experiments by James and to some by himself and Woodworth. James had sought to determine the effect of the learning of one kind of poetry upon the ability to learn another kind. First he learned 158 lines of Hugo's *Satyr*—a task which required 131 5/6 minutes. Then he devoted twenty minutes daily for 38 days to the learning of Milton's *Paradise Lost*. Going back to the *Satyr* for a test of his training, he found that to learn another 158 lines took him a total time of 151½ minutes. Judging from these results, he concluded that his "training" upon passages from *Paradise Lost* had not proved to be very efficient.

Thorndike and Woodworth performed an experiment to determine the amount of transference from activities involved in estimating areas, lengths of lines, and weights to other activities of the same nature. There was a slight degree of transfer which Thorndike and Woodworth believed to be due to "identical elements" found in the function practiced and the function tested. There was, they concluded, no actual transfer from one function to another, but since the two situations had certain elements in common, the earlier activity influenced the later.

This theory of identical elements which is held by the opponents of formal discipline, and which is based on somewhat limited evidence, both experimental and observational, has certain outstanding characteristics. Training, so it is claimed, in one form of response may affect subsequent training in some other form of response either positively, negatively, or not at all. One form of acquisition may facilitate or inhibit another form of learning. Again, as we have said, positive transfer or facilitation may occur inasmuch as certain elements occur in both types of responses. We can say then of two situations—*e.g.*, ax and bx—that x is the common element. The common element may take the form of a habit, a disposition, an attitude, an ideal, or a bit of information. Items of this sort acquired in one situation may be advantageously used in other situations. Furthermore, the amount of transfer at the higher mental levels is largely dependent upon the intelligence of the individual, upon his knowledge, and upon his degree of interest in a topic. In terms of these factors we find individual differences in the extent of transfer effects. Finally, it is pointed out that to be present in a significant degree in the class room, positive transfer must be an ever-present conscious aim in teaching procedure. It must stand as a major objective both of the pupil and of the teacher.

Serious students of this problem of learning have questioned the

validity of the theory of identical elements. Judd (*21*), for instance, finds it to be faulty and weak. The mere presence of identical elements, Judd would say, does not insure transfer. They may be potentially present but wholly unobserved by the untrained mind. Again, the identical elements are frequently contributed by the generalizing mind. Formalism and lack of transfer are not characteristic of subjects of instruction, but are products of the mode of instruction in these subjects. Furthermore, knowledge or skills which are being used in applications either in the evolution of higher thought processes or in the solution of practical problems is not formal. Finally, recognition of general principles implies a higher mental process than mere ability to solve the particular problem, and can never be taken for granted.

According to *Gestalt* psychology, a transfer of learning from one thing to another results from the intrinsic nature of configurations. A configuration, for instance, may retain its identity of structure and pattern even though the filling and the detailed content may change. That is, a configuration may actually be carried from one situation to another, or from one sense department to another. One may beat a rhythmic configuration with the hand, or hear it, or see it. In a way, we might say that transfer is the basis of much insight. It implies that the possibility of transfer may be, of itself, an indication of intelligent learning on the original occasion. This is quite similar to the thinking of Judd, and means that transfer, at least at the higher mental levels, cannot be explained in the mechanical manner suggested, for instance, by Thorndike.

Concerning the problem of the nature and the magnitude of transfer of mental training under actual class room conditions psychology has at present no satisfactory solution. According to Whipple, the best rule that can be laid down at this time is to introduce no subject into the curriculum for the sake of its disciplinary value alone, but to teach every subject in such a way as to secure from it all possible value in correct methods of thinking and worthy ideals of action.

The Nature of Learning Curves. A learning curve is a graphical representation of changes in behavior brought about by successive periods of practice. In general, learning curves take two forms, depending upon the values plotted on the ordinate, or vertical, axis. If the correct responses are plotted on the ordinate, the curve will be some variant of the ones found in Figure 41. If time or error scores are plotted on the ordinate, the curve is of the general character of Figure 42. The initial period of learning as portrayed by these curves is ordinarily one of rapid change. This usually means that the easier components of

the task are being readily learned, that interest and effort are quite pronounced, or that certain abilities already acquired are facilitating progress. A short period of inertia at the very beginning of the curve may indicate emotional disturbance or an inability to make an effective start.

If practice is continued long enough, most curves of learning reach a final level of attainment, usually by passing through a period of negative acceleration, or slow progress, due probably to the difficulty of mastering the final aspects of the situation. Whenever speed is a

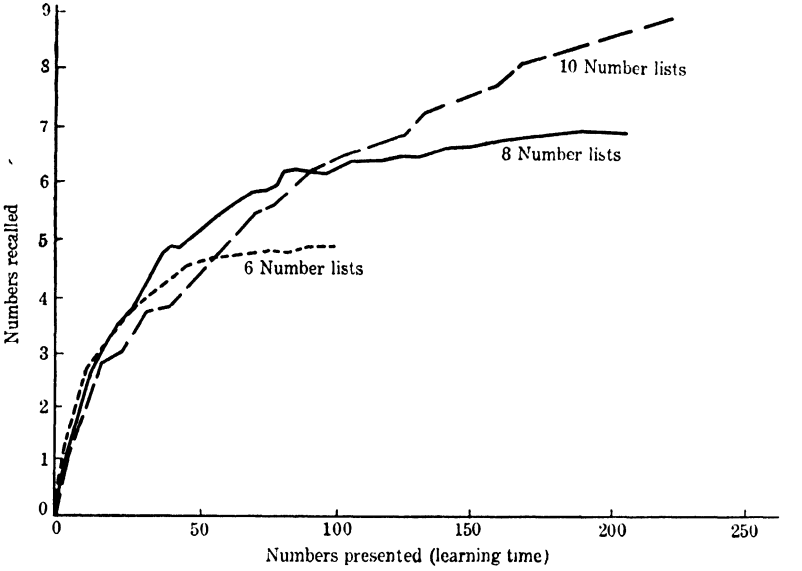


FIG. 41. General form of learning curves when correct responses are plotted on ordinate. From Robinson and Darrow.

factor, the physiological limit of the organism sets a level beyond or above which performance cannot go. Actual attainment rarely reaches this limit, however, but remains below and at some level which is socially and economically acceptable. Improvement may result, in such cases, with further practice if new incentives are added.

The curve of learning is not smooth, rising gradually from day to day, or from practice period to practice period, but shows short time fluctuations which depend among other conditions upon the interest and energy output of the individual at particular practice periods. Of more interest to the educator are the long periods in most learning curves during which no progress is shown. These levels are known as plateaus. Plateaus are probably due to decrease in enthusiasm or a let-down in

effort or to the necessity of perfecting certain lower level responses before the learner can proceed to higher levels of efficiency. That is, plateaus seem to be mere stopping places in improvement and need not necessarily prove discouraging to the student or to the teacher. Theoretically, plateaus may be due to any factor which slows up the learning process. Lack of effort, misdirected effort, loss of interest and incentive, fatigue and emotional difficulties may be regarded as indications that working conditions are not constant from time to time. If hierarchies

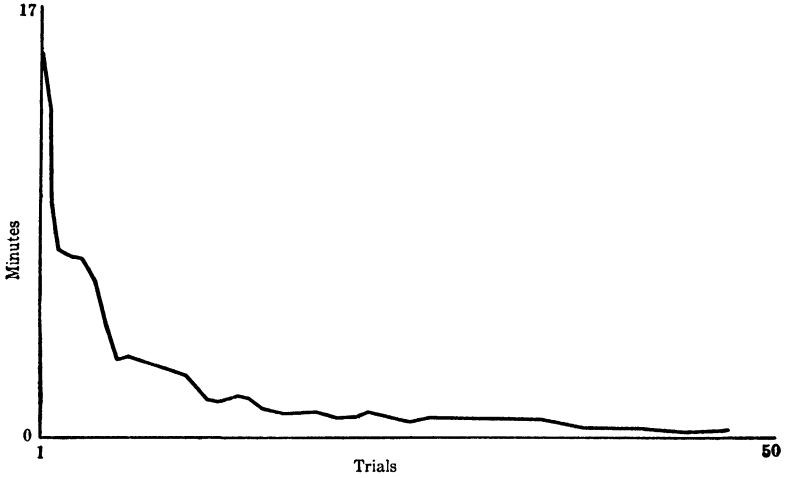


FIG. 42. General form of learning curves when time or error records are plotted on ordinate. From Watson.

of behavior patterns are the main concern in the production of plateaus, however, then they probably present a genuine and necessary aspect of some forms of learning.

Mention should be made here of the possibility of the part played by insight in learning being shown in the type of learning curve. Although some (See Hunter, *18*) defend the thesis that there is no adequate basis for the assumption of a peculiar "insight factor," or of more than one kind of learning, many learning curves apparently take a course which might well be explained on the basis of the operation of some function of the nature of understanding, and which the *Gestalt* psychologist regards as insight.

SPECIAL MODES OF LEARNING AND APPLYING SUBJECT MATTER

Various attempts have been made to distinguish between forms of learning. The most satisfactory way is probably in terms of the psycho-

logical functions most concerned in any particular case of learning. In this way, we get such forms as *sensori-motor*, which is really perception and action, *perceptual*, *emotional*, *imaginational*, and *thinking*. We assume that these functions are modified through repetition, exercise, instruction, and attitude. We wish to discuss each.

The Acquisition of Motor Skills. Much learning in school involves the acquisition of motor skills. Handwriting, drawing, shop work, physical training, athletics, pronunciation of foreign languages, manipulation of laboratory apparatus are some examples. Motor skills are clearly involved in part in many other school activities—in dramatics, expressive reading, singing, typewriting, and drawing. We must inquire concerning the steps involved in the process of acquiring useful motor reactions and the nature of the teacher's contributions to the process.

The various steps in sensori-motor learning under actual classroom conditions are usually given in such terms as setting the model, imitation, criticism, and drill. It is evident, of course, that the task must be suitable to the learner's ability. Moreover, he must feel a need for the skill to be acquired; that is, he must desire to learn. This latter aspect—the aspect of motivation—is not to be neglected, of course, in any form of classroom learning, but it must be kept in view especially in this type of learning because of the usual necessity for repeated practice or drill with the greater chances of boredom.

In setting the model for a motor activity the teacher must be critically guided. She must know, for instance, the most effectual ways of doing the thing as determined by experimental studies. Moreover, she must determine whether the procedure should be presented as a whole, or whether it should be broken up into parts for special consideration. Finally, she must decide upon the emphasis to be placed upon demonstration material and upon verbal instruction of one type or another.

As to the first we know that there are, in general, certain preferred methods. Good teachers, however, do not place too great insistence upon any one particular method. Ample allowance is made at all times for individual initiative and differences in performance. As to the second, it may be said that there are certain advantages in learning a performance at once and as a whole. But many complicated skills have to be acquired in parts. These parts should recognizably consist of more or less "natural" units of the complete performance. The comparative value of demonstration and verbal instruction is shown in the story of the teacher who said of her class in manual arts—"I just can't get my pupils to do things right. I explain and explain, but of the

three who do the best work, two are deaf and one doesn't understand English." Demonstrations are usually most effective, but verbal directions are helpful and often necessary. Pictures, diagrams, graphs, lantern slides, *etc.*, constitute devices for furnishing concrete material upon various classroom topics.

In attempting to direct his activity along lines laid down by the teacher in demonstration or in verbal instruction, the child frequently resorts to the use of models. In general, instruction in such cases should be centered upon the attainment of some objective rather than upon the slavish performance of particular movements. Usually in attempts to follow a model, some practice is necessary, which involves at times quite a bit of trial-and-success behavior. In all such cases, pupils should be encouraged to discover and to correct their own mistakes. Much time has been spent by psychologists and teachers in studies of how to make drill efficacious. These studies have resulted in a body of information which plays an important part in teaching technique. The results of some of these studies have already been discussed.

Learning to Perceive. We have previously shown that the manner in which an individual perceives is largely a matter of growth, of experience, and of training in self instruction. We have shown how perceptions are constantly modified by addition to or subtraction from the meaning side. During the course of perceptual development, complex situations are analyzed—details are observed more and more specifically, and at the same time these details are re-combined to give new meanings and patterns. The perception thus becomes richer and more comprehensive.

In the perception of spoken words, for instance, the child hears at first a "meaningless jargon"; then a frequently repeated word, phrase, or sentence of a certain inflectional pattern becomes associated with acts or objects. Words themselves come to be perceived as such in the same way; distinctions in grammatical form and usage, too, come to be understood and made; and finally, the perception and understanding of oral speech becomes a fine art. In much the same way the child learns to perceive the printed page, beauty, form, and the like.

The child's earlier perceptions may be modified "incidentally" while he is perhaps following other ends, and the adult often overlooks the fact that such things are *learned*. Much of teaching, however, is directly concerned with the building of perceptions necessary to the individual's daily life. The use of pictures, objects, museum exhibits, demonstrations, excursions, and the like are all designed to result in clear-cut perceptions obtained through direct experience.

Two forms of perception deserving of special mention here are the esthetic and the social sorts. In all forms of art there is a real question as to how much of the emotional enjoyment on the part of the art lover is native, and how much is acquired. A person with defective rhythmic perceptions, it is pointed out, will never write nor enjoy poetry. Moreover, with poor pitch discrimination he will neither create nor appreciate music, and with color blindness many phases of painting and decoration will remain an undiscovered world to him. Dashiell suggests that for a fine degree of artistic appreciation, an individual must have "first, a highly sensitized receptive apparatus; second, subtle and quick emotional responses; third, intelligence; and, fourth, if the appreciator is also to be a creator, he must have great motor dexterity" (*10*, 419). The objects which we like or dislike are recognizably dependent to a great extent upon the nature of our training in perceiving.

By social perceiving is meant the ability of an individual to "size up" a social situation—to recognize attitudes of people and to guide his own conduct according. Facial expression is one of the most obvious cues to social perceiving. Gates (*14*) has shown that a high degree of variability exists among children in their ability to perceive facial expressions from pictures, and that there is a general improvement in this capacity with increasing age. The child is forced through his contacts with others to order his actions along certain lines, and the primary cues which he repeatedly employs is the emotional behavior of his own kind.

In a study of the ability of the two sexes to *judge emotion and facial expression*, Allport found no pronounced difference. He did discover, however, that women make their judgments in about one-half the time required by men. His results lead Allport to believe that the ability to judge in the above mentioned way is largely acquired, and that it does not correlate with powers of observation in general. He assumes that it depends upon some special incentive or reason such as the opportunity afforded a member of a large family as contrasted with that of an only child; upon special interests or abilities such as the literary or artistic; and upon the personality type, especially in the relations of the individual to his social sphere. "No single cause," he remarks, "but a complex of capacities, circumstances, and traits appears to underlie the ability" (*1*, 230).

Changes in Emotion through Learning. When we consider what a tremendously important part emotion plays in the direction of human affairs, and when we regard the school as an institution of social control, we are forced immediately to realize that one of the primary functions of education must take the form of training in proper emotional re-

sponses. As a matter of fact, however, the school has been very backward in its assumption of the task of guiding and training the emotions. A number of factors have been responsible for this. Emotion has long been regarded as a "natural," instinctive mode of behavior. It is different from the intellect, which is regarded, so to speak, as a blank tablet awaiting development. The intellect can be "trained," but the emotions are hereditarily predetermined. It is largely useless to attempt to train them. Thus, the emotions have long been assumed to be little subject to control; that is, they are more inaccessible to attack by the environment than most of the other psychological activities. Finally, emphasis in the school has been laid upon the less subtle and the more "useful" and objectively measurable results of the educative process. It is quite easy to determine whether Johnny can add 2 and 2. But it is not at all easy to determine to what extent Johnny's emotional nature is changing from day to day.

One of the reasons that education has been unable to cope adequately with emotion is due to the fact that psychology has been backward in dealing properly with this phase of human experience. Of all the traditional problems of psychology, emotion has offered the greatest difficulty to descriptive and systematic treatment. The more recent genetic studies of the fundamental emotional patterns in infants have been very significant for education. They have emphasized the danger of regarding all emotions as innate reactions to specific situations, and have shown that the emotional life is capable of large modification during the course of the growth and the education of an individual—probably as much as any other variety of human experience.

Many attempts have been made to describe the essential steps in emotional growth. Each, no doubt, has certain desirable features. Of the many descriptive attempts, that of Hollingworth is outstanding. Hollingworth points out that, basically considered, emotional growing-up is a process best described as one of *gradation* and *transfer*. The process occurs in the following fashion:

(a) Original reactions are produced by total stimulating situations, which have not been analyzed into their component details. (b) A partial detail of such a situation tends thereafter to provoke a reaction similar to that made to the total situation, even when this detail occurs in new contexts. (c) This detail-evoked response is usually weaker than the original response, as is characteristic of consequents of incomplete stimuli. It may also be briefer, less extensive, and in other ways incomplete, but represents a familiar emotional core or tone. (d) Details that have belonged to several antecedent contexts will be followed by responses which vary according to laws of re-inforcement

and inhibition, and according to such influences as recency, frequency, and instigative potency on other grounds. (e) Constellating details, belonging to diverse antecedents, will through their mutual re-inforcements and inhibitions produce varied intermediate degrees of emotional completeness, as well as new patterns of combination.

From these simple beginnings of gradation, constellation, and transfer evolves the complex emotional life of later years. Emotional and attitudinal reactions become infinitely elaborated, organized, differentiated, attached to remotely analogous objects and to more abstract features, relations and situations (*17*, 376).

Words come, in time, to play the same part as things. Sentiments which are habitual modes of emotional reaction to given stimuli are built up about persons, acts, customs, ideas, institutions, duties, human relations, and philosophies of life. They are learned in ways not essentially different from learning to run, to eat with a fork, or to count up to ten. Failure to recognize this may result in an individual's developing temperamental twists, conflicts, and neurotic states.

Character training is a process of training desirable sentiments which will evoke socially valuable behavior. Weber believes that it is the business of education "to determine what the essential personality and character traits are, then to arrive at some kind of technique for engendering and inculcating them."

Because of their marked effects as controls of conduct, we can group ideals, sentiments, and attitudes together as similar emotional responses. Because most conduct can be evaluated in terms of social use, this education of the emotions is essentially directed toward what are usually called moral ends. Again Weber points out that morality is "not something that can be inculcated through a few illustrative lessons or devotional exercises. The way of moral rectitude lies in right conduct not through catechism, creed, worship, boundless faith, useless restraint or exuberant verbalisms. Morality cannot be a separate acquisition; it is the quality of education, the quality of life." By this he means that proper sentiments, attitudes, and ideals must form the very warp and woof of education—they must be in the very air. They must permeate the teacher's personality and method, the curricula, the total environment to the extent that at least in part they may be veritably absorbed.

This does not mean that there will not have to be some direct teaching. Because sentiments, ideals, and attitudes are in part intellectual and affected by knowledge, they may sometimes be furthered by a deliberate analysis of facts and ideas involved. One must be interested

in and understand a thing in order to "feel" properly toward it. The school should provide opportunities for the student to meet and acquire desirable ideals, standards, or attitudes. Under favorable conditions which will make him like them, he should be taught attitudes of thrift, ideals of health, and those emotional responses which prepare him for participation in civic affairs.

The extra-curricular activities, because they bring school life close to out-of-school life, furnish especially suitable means for training in the proper social attitudes. Athletics and sports, social functions, excursions, self-government, school publications, participation in charitable work, health and clean-up campaigns serve deliberately but unostentatiously to further social ends.

Regular classroom activities should be made to contribute to habits of punctuality, efficiency, honesty, thoroughness, critical judgment, open-mindedness—however specific such habits may be. If the subject matter itself can be of aid in establishing desirable character traits, so much the better. It does not seem at all improbable that the subject matter of history, science, geography, literature, and the like could be made to serve such ends.

Because so many of the responses of an individual are responses to other human beings, a great many of his emotional attitudes are socialized sentiments built around his family, his school, his profession, his country, or his race. Many times, deep-seated as they often are, these socialized sentiments are antagonistic to more individual reaction tendencies. Conflict arises. The individual is disturbed. Teachers should recognize that children differ widely in their respective abilities to tolerate conflict. Not infrequently those who are easily upset emotionally, when mild conflicts occur, are definitely neurotic, psychopathic, or nervously unstable. Their proper treatment demands a sympathetic hand and an understanding mind.

Such individuals in their attempt to escape their thwartings thresh about until they find some way out of the emergency. These devices to escape thwartings have been brought to our attention by the psychiatrists and psychoanalysts. Compensation, rationalization, and sublimation are some of them to be considered at another time. These temperamental twistings among adolescents clearly exemplify at times some of education's most serious mistakes and glaring failures. These blunders of education not infrequently become the cares of psychology and medicine, or the problems of our courts and penal institutions.

It should be a major function of education to prevent such failures. The school may quite effectively employ methods and agencies which

will aid the individual in maintaining his balance and preserving his integrity. Methods of this sort are mainly preventive—not curative. The school, for instance, can undoubtedly do its part in the maintenance of good physical health, in creation of ideals of behavior compatible with society, in the encouragement of proper recreational activities, in the development of avocations and hobbies, and in providing school-room tasks of such a nature as to relieve rather than to heighten emotional tension. Where the usual measures are inadequate in treating with the individual, special methods must be employed. Where the school room is obviously incapable of dealing with the individual, the clinic represents an invaluable ally. The time must come when the school room and the clinic stand as inseparable parts of a properly functioning unit.

Interests and Appreciations. Many statements of the aims of education have included the development of a many-sided interest or interests especially in connection with a worthy use of leisure—not only for the promotion of personal happiness, but for the welfare of society as a whole. It has been remarked that while, in their genesis, human wants and human interests are relatively few and simple, their range can be almost indefinitely extended. Their proper extension determines to a large degree the nature of individual and social morality, for we recognize that human wants and interests are the basic determiners of the values which we place upon things. Objects or actions come to be regarded as good or bad, useful or useless, right or wrong, beautiful or ugly, according to whether or not they satisfy human wants or sustain human interests.

Interests and appreciations are closely related to emotional attitudes and are acquired in ways not essentially different. A teacher cannot interest a child in something about which the child knows nothing. Knowledge is at all times fundamental to interests. Moreover, he must be brought to "feel" in a certain way, so that proper emotional attitudes toward the world and man may be established.

It should be remembered that the degree of interest and the extent of emotional appreciation may be greatly lessened if education dwells on non-essentials and fails to make the individual's capacity at the moment the point of departure in teaching. This is especially true in esthetic interests and appreciations—in music, in literature, in painting, and in sculpture. The devotion of too much attention to the strict mechanics of music, to the analysis of literary selections, and to the technique of painting and sculpture, quite early in the educative process, may strip the fine arts of any affective tone which they might otherwise

have possessed. Wisely guided attempts at creation introduced long before full standards of appreciation have been attained often gives significance to good music, real literature, and fine paintings that children would never attain through insistence on appreciation without opportunity for exerting creative effort along the same line. Composing simple poems or writing simple scores for music are invaluable aids in heightening interest, appreciation, and understanding.

Training in Imagination. Imagination occupies an important place in the affairs of daily life and in school work. In school the child is being constantly called upon to picture scenes, events, persons, and relations which he has never experienced perceptually. The clearness, exactness, and extent of imagining depend upon a complex of factors among which can be mentioned a wealth of sensory experience, facility in fitting old elements of experience into new situations, and the opportunity for using imagination in the activities of the daily life and the school.

In attempting to train the imaginative ability of children, provisions must be made for wide individual differences. Children vary in the kinds of imagery which they use. Some may be able to experience clear visual images of scenes and events about which they read. Others may be quite lacking in this particular respect. Children vary, moreover, in their range of perceptual experiences. Some enjoy a wide variety of such experiences; others are paupers in this respect. The child which has traveled widely generally possesses a background for imagination, the like of which is denied the shut-in or the child of narrow horizons. Finally, children vary in the use to which they put their imagination. Some individuals turn their imaginational resources outward and recreate the perceptual world. These are the objectively minded sort. Others use their imagination for the creation of worlds of phantasy in which the individual plays a major part. Here are the individuals who are inclined to withdraw from the work-a-day world. They are also the kind of persons who, on the whole, need more careful guidance. They are the dreamers whom most teachers fail to understand. The kindest remark that some teachers can make about such children is that they are lazy.

The formal school subjects offer many opportunities for training the imagination. They are, however, not enough. The fundamental need of wide sensory experience must always be kept in mind. Excursions, the school and municipal museums, pictures, stereopticon views, and the movies as well as a host of other devices should be employed. These furnish a fund of perceptual experience which shall serve as material for the imagination of the child. Equipped in this way, the child is

less likely to be diverted imaginationally into more unwholesome and less desirable channels.

Thinking. In ordinary usage, thought may mean any form of mental activity from the simplest day-dreaming to the most profound speculation. These two extremes of thinking might be termed "thinking about" and "thinking out." When we talk about "teaching to think," we use the term in the second sense, "thinking out," a sense to which the name reasoning is often given. It is a problem solving of the highest form. It is agreed that one of the major goals if not *the* major goal of the educative process is to train individuals effectively in this type of thinking. Such training must be based upon an adequate understanding of the thought process itself.

It is often said that thinking of the problem-solving variety takes place only when the more automatic responses fail, or when some practical or intellectual difficulty arises which engages the interest and effort of the individual and leads to the formulation of a problem. Thus the immediate occasion for thinking is some environmental difficulty about which an individual creates a thought problem. Under the guidance of this problem, materials given by way of memory or imagination and perception are accepted or rejected according to whether or not they are pertinent to the situation and bear upon the solution of the problem. A true thought *solution* is reached psychologically when the difficulty is removed for a particular individual, and the individual has gained some new information, a new opinion, or reënforced his old opinion.

As we have previously remarked, the thought process is very complex. It is dependent upon a multiplicity of factors. It is, in the first place, dependent upon a body of reliable information. An individual's thinking upon any subject is always limited by the boundaries of his information on that subject. In the second place, thinking depends upon the ability to formulate hypotheses—to provide possible suggestions bearing upon the solution of the problem. This raising of suggested solutions has been termed "guessing." Fertility in such suggestions depends indirectly upon the degree of intelligence and directly upon the background of actual information of the individual. A third factor in efficient thinking is an ability to criticize rigorously any suggestion advanced toward the solution of some problem.

Many of the inadequacies in children's thinking are to be attributed to such factors as these. Children are limited in their reasoning by the narrowness of the range of their experience and information; they are deficient in critical judgment—that is, they are willing to accept superficial and inadequate explanations. This is, of course, the result in large

measure of their somewhat limited experience. And they are less capable than the adult of the sustained, patient labor required for thinking.

Thought is dependent upon information, and because information is comparatively easy to impart, the school has made the imparting of knowledge a major part of its program. Unfortunately, the school has often lost sight of the fact that information is significant only to the degree in which it can be utilized in the solution of problems, or in the formation of attitudes and ideals, and has proceeded to make the imparting of facts an end instead of a means to an end.

The technique of using facts in thinking is quite different from merely knowing the facts. One may know without being able to use. Use means recognizing that certain facts are relevant to a problem; that is, it implies a proper understanding of the significance of these facts for the whole. One comes to think only by thinking. In order to think, children must have practice. This means that the activities of the school should be more concerned with the creation and treatment of thought problems. The child should be encouraged to face squarely those problems which may arise under chance happenings in his daily life. Furthermore, the pupil should be constantly encouraged to search for practical applications of the facts which he acquires. He should be made to feel a strong need for the information that he is required to learn. If it is worth learning, it is worth retaining, and if it is worth retaining, it should be suitable to the ends of appreciation and thought. By starting early in this way, an individual may lay a firm foundation for later achievement of a noteworthy character.

Thinking, like other forms of classroom activity, has to be well motivated by appealing to various lines of interest—either innately determined or acquired. Love of nature, curiosity, creativeness, sympathy, approbation, competition—in short, any legitimate interest that can be utilized in securing thinking to the fullest extent of individual capacity should be used. Classroom provisions must also be made for dissimilarities in the thinking abilities of different pupils, for such individual differences among the members of a group, for instance, tend at times to have an adverse effect upon this function. If a problem, for instance, is sufficiently difficult to engage the efforts of the most capable in the class, it is quite apt to discourage the duller members of the group. But if it is simple enough for the dull, it is most likely to bore the more highly endowed. Even in relatively homogeneous groups the presence of co-thinkers does not invariably lead to the best thinking on the part of particular individuals.

In general, we must say that if the school is to attain the major goal

of education, the textbooks, the courses of study, the methods of teaching, and the training and selection of teachers must be done with the aim of encouraging individuals to think, and to think more effectively. So far as it fails to lead pupils to a full use of their ability to think, the school falls short of its duty to society.

MEASURING THE RESULTS OF THE EDUCATIONAL PROCESSES

Far too little is known of the actual results of any given sort or amount of school education in terms of knowledge, skills, attitudes, interests, ideals, and ability to think. To say, for instance, that high school graduates at thirty earn twice as much as those who dropped out at the end of their freshman year may only mean that those who finish high school have higher native ability, on the average, than those who drop out. It may not be a true measure of the effect of education at all. Furthermore, until recently, educational products were mainly evaluated on the basis of *judgments*—usually the teacher's, and judgments of this sort are frequently unreliable.

It is not without significance that education as a science had its beginnings in measures of individual differences and in mental testing. In fact, the status of education as a science depends largely upon the accuracy with and the extent to which it can control and measure the changes which it produces in human beings. The measuring devices in use in the field are designed to gauge the results of education in quantitative terms apart from any subjective bias. Serious attempts are now being made to subject both educational procedure and its products to strict objective measurement.

Intelligence Testing. Intelligence was the first personality trait to be measured, and it was thought that with the objective measurement of intelligence a reliable instrument for the prognosis of achievement would be attained. But intelligence, while probably the most important personality trait, is only one, and it has been a matter of common observation that success in a given line of work is dependent upon many other factors within the individual such as special aptitudes, specific physical traits, emotional stability, patience and persistence, being a "good mixer," and the like. All the personality variables which might be listed play an indisputably important rôle in human success and failure. The limitations of intelligence as a basis for prognosis has led to efforts to supplement its measurement with estimates and measures of those non-intelligence factors which contribute to success. Supplementation has taken two main lines of direction: attempts to find tests for special aptitudes as a basis of predicting success in particular occupa-

tional fields or along certain lines, and attempts at finding objective measurements for the many distinguishable volitional, temperamental, emotional traits. Belonging to the first group are tests such as the Stenquist test of mechanical ability, the Seashore tests of musical ability, the Thurstone studies in telegraphy, and Kitson's studies of proof-reading ability. In the second group are found tests similar to the Downey Will-Temperament tests and the Pressey *X-O* tests of emotional attitudes.

Tests of School Achievement. On the side of school achievement, tests and scales for writing and drawing were among the first to be introduced. Measures of other motor skills—artistic, athletic, mechanical, and vocational—have been devised lately. Tests of native aptitude along these lines as well as tests of actual achievement have been attempted with results which promise greater success in the future. Among these latter tests are listed tests for musical and mechanical ability, and prognostic tests of foreign language, stenographic, and typing aptitude.

Since information is relatively easy to measure, objective information tests have been developed to a greater degree than any other type. Many valuable information tests are available in practically every elementary and high-school subject. Most of the so-called achievement tests are of this nature. If the test is designed to measure the degree of proficiency actually achieved in some branch of industry, it is usually known as a trade rather than as an achievement test.

Personality Tests. As we have mentioned before, quite recently great interest has been shown in attempts at devising tests of conduct. Thorndike and Gates report (*39*, 291) that during the year 1927 there appeared more than 200 publications concerned with measuring conduct in some form. There is a group of tests that claim to measure ethical, moral, social, and religious discrimination. Some typical examples are as follows:

1. Ability to judge foreseen consequences—Chassell, Myerson
2. Ability to discriminate religious values—Chapman, Chassell
3. Content of moral concepts—Brotmarkle
4. Ability to evaluate offenses, etc.—Fernald, Kohs
5. Ability to judge rightly in moral dilemmas—Sharp, Fernald
6. Ability to pick out worst word in a list—Pressey
7. Judgment of the moral, religious, or pleasure value of a situation —May
8. Identity of motives—Van Wagenen
9. Ethical discrimination—Kohs, Cady, Hartshorne

There are other tests which profess to measure such gross features as character and personality traits. Some are of the following sort:

1. Aggressiveness—Moore
2. Ascendance-Submission—Allport
3. Caution—Brown
4. Confidence—Trow
5. Conformity—Deutsch
6. Conscientiousness—May
7. Decision Speed—Bridges, Filter, Gibson
8. Decision Types—Bridges
9. Expansion-Reclusion—Allport
10. Flexibility—Downey
11. Honesty—Franzen
12. Honor—Voelker
13. Insight and Evaluation—Allport
14. Interest in Detail—Downey
15. Originality—Chassell
16. Persistence—Chapman
17. Perseveration—Lankes, Bernstein
18. Reliability—Voelker, Cady
19. Resistance to Opposition—Downey
20. Self-Assurance—Downey, Filter.
21. Self-Estimation and Evaluation—Allport, Knight, Franzen
22. Social Perceiving—Allport, Gates, Langfeld
23. Suggestibility—Brown, Otis
24. Trustworthiness—Voelker, Cady
25. Truth—Voelker
26. Unselfishness—Miln
27. Volitional Perseveration—Downey

It is as hard to devise tests for the measurement of interests, appreciations, attitudes, and ideals as it is to provide practice exercises to develop desirable responses along these lines. But neither may be entirely impractical nor impossible. As a matter of fact there is today a group of tests which claim to measure interests, attitudes, and the like. Among these are the following:

1. Interest—Freyd
2. Range of Interest—Miner
3. Degree of Interest—Burtt
4. Attitudes Such as Altruism, etc.—Hart, Shuttleworth, Maury
5. Prejudices—Watson
6. Religious Attitudes—Case
7. Social Relations—Ream

There is a fourth group of character tests which might be mentioned —a group which purports to measure instinct and emotion. The following tests would be listed under this head:

1. Fear, Anger, Sex-Aggressiveness—Moore
2. Emotional Stability—Mathews, Woodworth
3. Emotional Affectivity—Pressey
4. Emotional Inhibition—Crane
5. Relative Strength of Certain Instincts—Moore

The Present Status of Educational Measurements. The fact that the measurement of educational products is in no sense fool-proof has temporarily placed the whole movement in some quarters under a kind of cloud. "Norms" and standards have been set us as ideals of achievement instead of constituting a statistical statement of actual achievement; or low I. Q's have been made to pursue unfortunate individuals in a way not unlike a police record. But the misuse of a tool is not necessarily a fault of the tool. Misuse of tests is not of necessity intrinsic in the tests themselves. Even perfect tests could scarcely be expected to work ideally in the hands of individuals lacking in proper understanding of them. And no one claims that the tests are, at present, perfect devices. This should not blind us, however, to the fact that they are amenable to improvement. They have shown their worth in the past, and there is every reason to believe that the future will see a sensible enlargement of their use and their value.

We have reviewed certain problems of education from a psychological standpoint. Here are the problems of the learner and the learning process, the most desirable methods of producing changes in individuals, and the means of measuring these changes. Turning to the future, we recognize that the immediate problem before education is to find ways and means of improving the existing methods of instruction and measurement in education. We realize that the possibilities of research methods in education have been clearly demonstrated by the production and use of intelligence and personality tests, by the establishment of achievement norms at various ages in the different school subjects, by the evaluation of competent methods of teaching particular subjects accomplished on the basis of statistical science. It now remains for the teacher "to meet research expertness with a teaching expertness which shall include the knowledge necessary for the intelligent appropriation and application of the material provided by research."

We close our discussion with a word from an outstanding educator:

No conclusion of scientific research can be converted into an immediate rule of educational art. Nevertheless, scientific findings are of practical utility

when used correctly. . . . Pressure to demonstrate immediate utility in school administration and instruction is dangerous because of the complexity of the subjects involved. The school room involves more variables and variables harder to control than are found in the conditions of the laboratory. . . . Scientific results should be taken as tools to direct attention in observation and reflection to conditions and relationships which would otherwise escape us. . . . That is, scientific results should function mainly through an altered mental attitude (*11*, 19, 60).

BIBLIOGRAPHY

1. Allport, F., *Social Psychology.* 1924.
2. Ballard, P., "Oblivescence and Reminiscence," *Brit. Jour. of Psychol., Monog. Suppl.*, 1913, *1*.
3. Bolton, F., *Principles of Education.* 1911.
4. Book, W., "Will to Learn," *Ped. Sem.*, 1922, *29*, 305.
5. Bray, C., "Transfer of Training," *Jour. of Exper. Psychol.*, 1928, *11*, 443.
6. Burton, W., *The Nature and Direction of Learning.* 1929.
7. Cason, H., "Criticisms of the Laws of Exercise and Effect," *Psych. Rev.*, 1924, *31*, 397.
8. Cheng, N., "Retroactive Effect and the Degree of Similarity," *Jour. of Exper. Psychol.*, 1929, *12*, 444
9. Cummins, R., "Improvement and the Distribution of Practice," *Teach. Coll. Contrib. Educa.*, 1919, *97*.
10. Dashiell, J., *Fundamentals of Objective Psychology.* 1928.
11. Dewey, J., *The Sources of a Science of Education.* 1929.
12. Ebbinghaus, H., "Memory," 1913, *Teacher's Coll. Educ. Rep.*, *3*, 123.
13. Gates, A., "Recitation as a Factor in Memorizing," *Arch. Psychol.*, 1917, *6*.
14. Gates, G., "A Test for Ability to Interpret Facial Expressions," *Psychol. Bull.*, 1925, *22*, 120.
15. Goodenough, F., and Brian, C., "Certain Factors Underlying the Acquisition of Motor Skill by Preschool Children," *Jour. of Exper. Psychol.*, 1929, *12*, 127.
16. Gordon, K., "Class Results with Spaced and Unspaced Memorizing," *Jour. of Exper. Psychol.*, 1925, *8*, 227.
17. Hollingworth, H., *Psychology, Its Facts and Principles.* 1928.
18. Hunter, W., "Experimental Studies of Learning," *Foundations of Exper. Psychol.*, ed. by Carl Murchison. 1929.
19. Jenkins, J., and Dallenbach, K., "Oblivescence During Sleep and Waking," *Amer. Jour. of Psychol.*, 1924, *35*, 605.
20. Jersild, A., "Primacy, Recency, Frequency, Vividness," *Jour. of Exper. Psychol.*, 1928, *12*, 58.
21. Judd, C., *Psychology of High School Subjects.* 1915.
22. Koffka, K., *The Growth of the Mind.* 1928.
23. Krueger, W., "The Effect of Overlearning on Retention," *Jour. of Exper. Psych.*, 1929, *12*, 71.
24. Lakenan, M., "The Whole and Part Methods of Memorizing Poetry and Prose," *Jour. of Ed. Psychol.*, 1913, *4*, 189.

25. Lashley, K., "Nervous Mechanisms in Learning," *Foundations of Exper. Psychol.*, ed. by Carl Murchison. 1929.
26. Luh, C., "Conditions of Retention," *Psychol. Monog.*, 1923, *31*, 44.
27. McGeoch, J., and Melton, A., "The Comparative Retention Values of Maze Habits and Nonsense Syllables," *Psychol. Bull.*, 1929, *26*, 144.
28. Monroe, W., DeVoss, J., and Reagan, G., *Educational Psychology*. 1930.
29. Pechstein, L., "Whole *vs.* Part Methods in Motor Learning," *Psychol. Monog.*, 1917, *23*.
30. Pintner, R., *Educational Psychology*, An Introductory Text. 1929.
31. Pyle, W., and Snyder, J., "The Most Economical Unit for Committing to Memory," *Jour. of Ed. Psychol.*, 1911, *2*, 133.
32. Reed, H., "Part and Whole Methods of Learning," *Jour. of Ed. Psychol.*, 1924, *15*, 107, 248.
33. Robinson, E., "The Similarity Factor in Retroactive Inhibition," *Amer. Jour. of Psychol.*, 1927, *39*, 297.
34. Ruch, T., "Factors Influencing Relative Economy of Massed and Distributed Practice in Learning," *Psychol., Rev.*, 1929, *35*, 19.
35. Sandiford, P., *Educational Psychology*, An Objective Study, 1929.
36. Skaggs, E., "Further Studies in Retroactive Inhibition," *Psychol. Monog.*, 1925, *34*, 25.
37. Steffens, L., "Experimentelle Beiträge zur Lehre vom ökonomischen Lernen," *Zeit. f. Psychol.*, 1900, *22*, 321.
38. Thorndike, E., and Others, *Adult Learning*. 1928.
39. Thorndike, E., and Gates, A., *Elementary Principles of Education*. 1929.
40. ———, and Woodworth, R., "The Influence of Improvement in One Mental Function upon the Efficiency of Other Functions," *Psychol. Rev.*, 1901, *8*, 247, 384, 553.
41. Tolman, E., "A Behavioristic Account of the Emotions," *Psych. Rev.*, *30*, 1923, 217.
42. Watson, G., "What Shall Be Taught in Educational Psychology?" *Jour. of Ed. Psychol.*, 1926, *17*, 577.
43. Weber, O., *How We Become Moral*. 1930.
44. Whipple, G., *Manual of Mental and Physical Tests*. 1915.
45. Winch, W., "Should Poems Be Learnt by School-children as 'Wholes' or in 'Parts'?," *Brit. Jour. of Psychol.*, 1924, *15*, 64.
46. Witasek, S., "Über Lesen und Rezitieren in ihren Beziehungen zum Gedächtnis," *Zeit. f. Psychol.*, 1907, *44*, 246.

CHAPTER XI

PSYCHOLOGY OF EFFICIENCY

Individuals differ in many respects. One of the most important differences for industry is the manner in which individuals are unlike in terms of efficiency. Some are able to produce much; others, little. Some do work of high quality; others are able to turn out only mediocre materials. Some are very accurate and thorough; others make many mistakes. Where unusual productivity, high quality, and thoroughness are demanded, a premium is put upon those who possess qualifications which contribute in these ways. Although industry is often thought and spoken of as being inhuman, it involves human beings at every turn. Human needs, purposes, and desires are back of every phase of it; human labor, skill, understanding carry it forward; human beings use the varied product. From each of these angles, much could be written of industry and its problems. Here we shall be concerned largely with the problems of the individual in industry, the selection of some rather than other men for certain occupations, and the many factors which affect the efficiency of the worker. Later we shall speak of the problems of advertising—of getting the products, some rather than others, into the hands of human beings.

During the discussion of our present topic, we must always bear in mind the complexity of working conditions. We must recognize that with the multiplicity of factors under which man goes about his daily work, many chances for error abound in any serious attempt to study him. Human motives are so diverse, and human ingenuity is so great that it is indeed a difficult task to write understandingly within the limits of a chapter of this sort of the factors which affect his efficiency. Some grow impatient that more has not been accomplished by psychology in this field. A proper realization by the student of the stupendity of the task of untangling the many factors which affect man in his industrial and productive relations will serve as a wholesome balance. Time, patience, understanding, and a desire to serve have done much in all those lines of endeavor toward which men of science have resolutely set their faces in their determination to understand and to control life processes. In this connection we recall the words of a

great thinker upon the task of science: "The knowledge of causes and secret motions of things, and the enlarging of the bounds of human empire, to the affecting of all things possible." We, then, seek here knowledge of a few of the more outstanding conditions which affect human efficiency.

Let us indicate by way of orientation some of the problems of industrial psychology. Among others we find the following: the selection and training of workers, the use of incentives or motives, the proper arrangement of the materials of work, the adaptation of tools to the worker, the proper distribution of periods of labor and rest, the effects of the physical environment upon the worker, the elimination of unnecessary and wasteful movements, and the maintenance of morale. Some of these problems we shall discuss in detail; others we shall pass by hurriedly; still others we must ignore. Our first task starts with the individual as he presents himself for employment.

SELECTION OF EMPLOYEES

Men's desires and ambitions often outrun their abilities. This is particularly true when men seek gainful employment. Of the nature of their desires, we are quite sure. Of the extent of their abilities, there is often much doubt. Before an employer can proceed intelligently with the applicant for some position, he must at least possess information of two sorts. He must know about the character, the temperament, the intelligence, and the skill of the individual; and he must know about the type of work for which the individual is being considered. The first is largely the problem of scientific selection of men; the second is the problem of job analysis. We shall discuss the latter, then turn to the former.

Analysis of Task. Specialization is the keynote of modern industry. No longer is it a matter of any man for a job. Each task is highly specialized and for its successful performance requires individuals who possess particular qualifications. In order to get at the necessary qualifications of the worker, a careful study of the job is first demanded. Properly done, this means that many men must be observed at a particular line of work; descriptions must be obtained from the worker, from supervisors, and from men especially trained to get at the problem of what is done on a particular job—that is, what is demanded of the worker in the execution of a particular task. From such reports, a knowledge of the *essentials* of each line of work as well as an understanding of the more outstanding characteristics of the most desirable "type" of worker in terms of age, intelligence, general education, specific train-

ing, physical traits, and the like may be secured. These job specifications placed in the hands of the employment agent when he faces the applicant constitute an invaluable aid. He knows in detail what will be expected of the particular man who is to be selected to go into a particular place. His task is now resolved into a determination of the fitness of the man for the job. He may determine his fitness either through a personal interview or through the employment of objective tests, or both.

The Interview. The interview is and probably will remain a very important method of determining fitness, although it possesses certain unreliable features as we shall try to show. The interview ranks first, according to Griffitts, in importance.

> Important as tests may be in their place and when discriminately used, they will be used to supplement rather than to supplant the interview, because any smoothly working concern depends upon more than the physical fitness, intellectual ability, skill or competence, honesty, aggressiveness, etc., of the employees. A man may be a useful member of one firm and not of another from the fact that he is in sympathy with or has faith in the policies of the one company and not with the other. Quite apart from competence, a man's personality may be such that he will fit neatly into one organization, but would be out of place in another" (*9*, 93).

The interview is of value, then, because it aids in discovering certain traits; *e.g.*, emotional and temperamental attitudes—which do not submit so readily to other modes of attack. It also furnishes information about the personal make-up of the individual: his manner of dress, his speech, his bearing—in short, the nature of the general impression which he conveys. The interview may fall short of its purposes, however, largely because of several possible weaknesses on the part of the interviewer. If the latter is not careful of his prejudices, he may reject good material because he does not like the cut of a man's clothes, the shape of his nose, and the color of his eyes or his hair. That each of us has prejudices of this general sort is generally recognized. Most of us, however, do not find the need of holding them so rigidly in check. Moreover, the interviewer may fail if he generalizes widely and loosely from certain characteristics of the applicant. He may, for instance, assume because a man is not careful in his dress that he will not be careful in his work, or because his hands are dirty that he is not inclined to be tidy. Finally, the interviewer may fail if he places the applicant at a distinct disadvantage so that the latter is so ill at ease or nervous that he does not do himself justice. Nervous men who make a poor

showing in an interview may be perfectly self-possessed when put at the execution of some task in which they have a chance to show their ability.

To what extent is the interview reliable; that is, to what extent do different interviewers of the same man agree upon the nature of his qualifications? This is an important problem. If men are able to select other men through a careful sizing-up process in the interview, the knotty problem of picking the man possessed of characteristics which best fit him for a particular line of work is solved. In seeking an answer to this question, Hollingworth studied the rating given to fifty-seven applicants who were individually interviewed and rated by twelve experienced salesmanagers in terms of the applicant's suitability for a position. Each manager was asked to *rank* each applicant on a "scale" from 1 to 57. Position 1 was reserved for the most suitable; 57 for the least suitable individual. Table XIX gives the ranking assigned to the first five applicants by each of the twelve judges. Applicant C, for example, was given first place by one and fifty-seventh place by another judge. Of the reliability of personal interview Hollingworth has this to say: "However much the personal interview may be improved by better methods of inquiry and report, in its traditional form it is highly unreliable" (*11*, 118).

TABLE XIX

Applicant	Judges											
	1	2	3	4	5	6	7	8	9	10	11	12
A	33	46	6	56	26	32	12	38	23	22	22	9
B	36	50	43	17	51	47	38	20	38	55	39	9
C	53	10	6	21	16	9	20	2	57	28	1	26
D	44	25	13	48	7	8	43	11	17	12	20	9
E	54	41	33	19	28	48	8	10	56	8	19	26

In order to escape the apparent unreliability of the unsupported interview as well as to add further to their knowledge of workers, men have turned to the employment of additional methods. They have sought the use of more specialized methods of examination. Of these the most outstanding is the objective test. Since we have previously referred to the nature of such tests, we shall deal very briefly with them here.

Some of the questions which the employer raises concerning the applicant have to do with his intellectual, emotional, and temperamental nature. It is recognized in industry that many men of superior intellect

not contentedly remain long at certain tasks of a highly monotonous are; other persons of lesser abilities, however, continue happily at same tasks. Some men are possessed of little emotional stability; ers seem able to control themselves in the most trying situations. m certain lines of evidence at hand, it seems possible to point out, rather surprisingly accurate degree, the men who will tend to make d or the men who are more likely to fail in given lines of endeavor. s fact is strikingly brought out, according to Snow, among the ers for the Yellow Cab Company. Figure 43 shows the number of idents of the Yellow Cab Company for each of the first four months

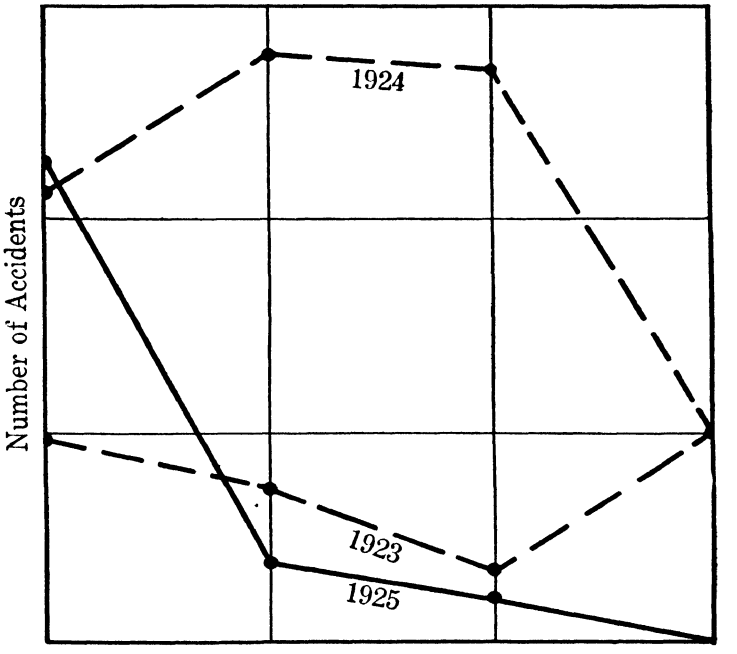


FIG. 43. Showing occurrence of taxicab accidents during first four months of three years. In 1925, tests were used to select drivers. From Snow.

three consecutive years. The curve for 1925 represents the number accidents following the use of tests to determine the driving fitness men. There is a significant drop in the "accident" curve.

In all cases the objective tests seek to measure what the individuals l do under given conditions. The test conditions may be merely a mple of the total working situations, such as typing, running a lathe, pairing a car, *etc.*, or they may be analogous conditions in which

some function or functions known to be demanded in the actual work are measured. What a person can do in two or three hours of testing is taken as a true sample of his ability to do actual work. If a position calls for such abilities as rapid and coördinated movements of the arms, accuracy of aim, quick grasp and retention of numbers and names—all of which traits are demanded, for example, of telephone operators—a measure of such may be secured by means of objective tests without the necessity of a trial of several months duration under actual working conditions.

The value of trade tests is determined mainly by giving them to those individuals who have good records and to those men who have poor records; to those individuals who are recognized as efficient and to those men who are held to be inefficient. If the men of the efficient sort do well, and if the inefficient do poorly upon them, it is assumed that the tests are valid. But they possess no value if poor workmen do as well as good workmen upon them. A further check consists in taking the test scores of a number of applicants, and checking them from time to time against the subsequent records of the tested men to discover how nearly the men live up to the previous prediction of success or failure. In all cases of this sort, of course, the men know nothing of this procedure of checking their working performance against their earlier showing on the tests.

FACTORS AFFECTING EFFICIENCY OF OPERATION

The psychological problems of efficiency do not merely concern the selection or determination of the abilities of the worker. There are also the many conditions which affect the efficiency of the worker after he is established at his task. These contributing conditions may be either intra-organic or extra-organic. Among the former we find fatigue, worry, loss of sleep, illness, and habit interference. Among the latter we may mention such factors as the use of drugs, improper ventilation, climate, season, and weather. Since these are the conditions which determine finally the character of the worker's performance, we must consider certain of them in detail. We shall assume that any factor which *affects personal efficiency operates likewise to affect industrial efficiency*. We recognize only individual efficiency.

Fatigue. Of the general factors which determine the efficiency of the worker no one is more important than fatigue. Fatigue is the accompaniment or the resultant of work. It is the penalty of exercise. It comes quickly to some and slowly to others. It seems to color the whole of one's life activities. It touches, for instance, upon the problem

of the quality and quantity of achievement or production, upon the large problem of conservation of human life, and upon the general problems of relaxation and recreation. Fatigue may be considered either in terms of the way in which an individual *feels*, or in terms of *output, production*, or actual *achievement*.

Approached from the one angle, fatigue is a psychological state characterized by clear bodily perceptions of weariness or lassitude, and by a clear realization that a decidedly greater effort is required in order to continue some performances at the earlier level of efficiency. If we do not include under the latter a sharp loss in the ability to perceive or think steadily about some object, situation, or topic, we then have a third set of characteristics; namely, a strong disinclination for work, a desire for rest, and a pronounced tendency for attention to wander. All of these characteristics are fairly reliable indices of fatigue, but not wholly so. At times one may actually feel tired, experience a strong desire to rest, and be unable to attend, without really being fatigued in the sense of being unable to continue efficiently. Considered in terms of output, fatigue may be best defined as the decrease in efficiency. It is then characterized either by a drop in the *quantity* of production: the number of problems solved or the number of bolts riveted; or by a loss in the *quality* of work: more wrong answers are given, more mistakes occur, or more pieces are marred or broken.

The bodily effects of fatigue are seldom restricted to small regions of the organism. Under local stimulation and the movement of some one set of muscles, there may be a heightening of fatigue that is fairly local in extent. Usually, however, through the medium of the blood stream the effects of fatigue are widely felt throughout the organism. Not infrequently the entire individual is involved. That the blood may actually be responsible in this way for a widespread distribution of fatigue products has been clearly shown by a study of Mosso. Mosso injected a portion of the blood of a greatly fatigued dog into the circulatory system of an unexercised or rested dog with the result that the latter immediately showed behavior of the sort found in dogs under prolonged exercise.

Conditions of Fatigue. We recognize that the immediate causes of fatigue are mainly physiological in character. Under exercise, there is a depletion of the bodily materials required for activity. Glycogen, for example, is released from the liver and the materials of the muscles and the neurones are drawn upon. While this withdrawal or "destruction" of materials may be effective in producing fatigue, it is not as a rule as serious as the accumulation in the receptor-conductor-effector

mechanism of the waste materials of the organic functions. The presence of such by-products of organic activity as lactic acid and carbon dioxide produces a temporary toxic condition of the organism and at the same time materially lessens its efficiency. The toxic substances of a fatigued state are assumed to affect especially the nerve junctions in the receptor-conductor-effector mechanism, and particularly the place where the neural elements come in contact with the muscles. The primary effect of the fatigue products here is to increase the *resistance* which the synapse offers to the passage of the nervous impulse. As a result the muscle either fails to contract or more nervous energy is required in order that the impulse may be able to negotiate the synaptic crossing. With increased blocking or resistance, some of the nervous energy may be diverted along new channels where the resistance is less. Old behavior patterns are in this way disturbed under fatigue. They do not complete themselves in the usual manner. This is one explanation commonly offered for the characteristic wandering of attention under fatigue. It also throws light upon that interesting problem of the gradual breakdown under great fatigue of long established *moral* patterns—under great fatigue the individual acts in ways which are strange to those who have known him under unfatigued conditions. In addition to the local effects at the synapse which produce changes in the individual activities, there is probably some accumulation of waste materials throughout the whole of the neurone.

The contributory conditions or causes of fatigue are numerous. Among them we indicate the following: the environmental conditions of the worker, the constitution of the worker and the nature of the task, and the working habits of the individual. Since these constitute very important problems for the psychologist, we cannot well pass them by without consideration.

Environmental Conditions. Of the environmental conditions which produce fatigue we mention for purposes of discussion those which act as distractions and those which have to do with the problem of illumination. Of the former, noise is perhaps the most important. Noise increases fatigue by the added effort necessary in order that the worker may keep his attention upon his task. Where there is repeated interruption of noisy nature, the individual's energy is dissipated in his attempts to hold himself to his work. Where the noise is continuous, the individual may come after a time to ignore it. He becomes habituated. But even then noise is assumed to wear away at the vital energy. Energy which otherwise would have been available for work is now wasted. While the individual may achieve just as greatly as under

less noisy conditions, he expends more energy. Laird, for example, found that not only was 19% more energy consumed in typing under noisy than under quiet conditions, but there was a decrease of 4.3% in speed. On the other hand, it has been claimed that a slight amount of distraction may be beneficial. It may serve, so it is claimed, to stimulate the individual. He either deliberately or unknowingly strives to overcome the difficulty, and in so doing "speeds up" in his work. It should be recognized, however, that this extra effort constitutes a drain upon the energy reserves of the individual. Whether it is undesirable is as yet an open question.

b) **Lighting.** Improper illumination could be considered as a distraction. We shall, however, consider it separately. The problem of illumination relates in several ways to our general problem of fatigue. Light may produce fatigue by being so dim that the individual must unduly exert himself in order to follow his work. Where it is too bright, it may also have undesirable effects. In either case, it may contribute to fatigue. Moreover, if the light source is not uniform—that is, if there is a bright light to one side of the worker—he must continually overcome the tendency to turn toward the light with a resultant heightening of fatigue. In general, uniformity of illumination is more desirable than uneven intensity because the eye can adapt itself within limits to either high or low degrees of illumination provided it is uniform. It cannot, however, adapt to a lack of evenness in illumination. Glare from bright objects is extremely tiring, so that the efficiency of the worker is considerably lowered where glare, either from improper lighting or from bright environmental objects, exists. In all cases, indirect lighting is most desirable

Good lighting tends both to prevent distraction and discomfort and to increase efficiency. Harrison cites the results of a change in illumination in a coal mine as a result of which an increase of 14.5% of output was obtained with a decrease of 22% in the amount of non-combustible material delivered to the surface (p. 114). Hollingworth points out that the presence of a light directly in the field of view may decrease the worker's visual efficiency from 25 to 30%. Under the best of conditions, artificial illumination is not as desirable as daylight. Myers shows that in cotton weaving the use of good artificial light in place of daylight reduced the output by 5%, and in the more delicate processes of silk and fine linen weaving it reduced the output by 10 and 11% respectively (*22*, 75).

c) **Constitution of the Worker and the Nature of the Task.** Many individuals suffer unduly from fatigue because they are not physically

fitted for the particular work they are attempting to do. A very tall person put at a bench, so arranged that the execution of a task necessitates constant stooping or reaching down, becomes more fatigued than a shorter person engaged in the same task. An individual who tends to move slowly, when put to work upon some apparatus requiring rapid movements, is thrown out of his normal pace. As a result, he tends to become unduly fatigued. Persons who suffer undue fatigue because they are ill-suited physically for a given task are quite likely to experience an undesirable attitude toward the work. They tend to develop grouches or to find fault with their work. Their efficiency is lowered. Efficient workmanship requires that provision be made for individual differences in workers by proper arrangement of the working conditions. Benches must be adjusted to the individual—not the individual to the bench. Chairs and tools must be so constructed and placed as to prevent the unnecessary and wasteful expenditure of energy.

Individuals of a certain degree of intelligence and of a certain temperament cannot be set at highly monotonous tasks. Many industrial concerns recognize that some men are apparently unable to succeed at certain tasks as well as at others because of dissatisfaction with the monotony of the task. Arrangements exist whereby such men may be transferred from work that is psychologically disturbing to work that is less disturbing. There are, moreover, individuals who are too short intellectually for some jobs. Too much is demanded of them. The constant goad from which they may suffer under such circumstances tends to wear down their reserve energies. They incline toward a nervous breakdown. Such men are better suited for tasks of more highly automatized and less exacting nature.

Working Hours and Habits. Largely because of fatigue, individuals show differences in efficiency at different hours of the working period. Productivity appears to be a function of the time of day. Men are most efficient shortly after they begin a work period. There is a short time during which they get "warmed up" and then for a time they work at a high level. With the onset of fatigue, efficiency drops (See Figure 44). Moreover, it appears that of a whole 24 hour period, daylight contributes to a greater efficiency. Men who work at night are said to suffer a greater degree of fatigue than the performance of the same tasks entails during other parts of the day. Furthermore, accidents occur with higher frequency among night workers—a fact which is usually explained in terms of a greater degree of fatigue.

Efficiency appears to rest upon the total length of the working period. Slowly but gradually those in charge of industrial concerns are

beginning to realize that, within limits, total output is not dependent upon the actual length of working day. They are coming to recognize that it is possible to reduce the actual number of working hours and at the same time increase the quantity of output. Here we have two factors operating. There is a decrease in the degree of fatigue experienced under the longer hours of labor, and there is increased motivation. Individuals realize that more is now expected of them, or more work is to be done within a given period. Myers (*22*) cites some interesting results in this connection. In one case, when the hours of workers engaged in turning fuse bodies were cut from 63½ to 47½ per week, the weekly output rose by 13%. When an 8 hour shift was cut to a 4 hour shift, tin workers showed an increase in hourly output of 11.5%. Glass workers whose shift was cut from 10 to 8 hours showed an increase of 10% in production. There was also a reduction in the amount of spoilt work. In a great many cases, the reduction of the number of hours of labor increases efficiency by avoiding the usual drop in production that comes toward the end of the longer working period. Longer hours, then, do not necessarily mean greater output.

The introduction of rest periods within the working day appears to decrease fatigue and to increase the degree of achievement. The individual has an opportunity during such periods to recover partially from the effects of fatigue. There are no arbitrary periods at which such rest intervals should occur. Their number, distribution, and length appear to depend largely upon the type of work. Heavy and quickly exhausting labor is assumed to be best performed in short working periods interspersed with longer rest periods. This assumption finds confirmation in the results of several studies. Those made by Taylor on men engaged in loading pig iron are perhaps most interesting. Taylor found that where men handled pigs weighing 92 pounds, the optimum working period was seven minutes followed by a rest period of ten minutes. Under such distribution of rest and working periods, the men were actually active only about 43% of the time, yet the final results showed an increase in output of more than 260%. Whereas before, each man handled 12½ tons per day, he now handled 47½ tons. Moreover, while the wages were increased 60%, the actual cost of loading decreased 66%. Concerning the value of the rest pause Myers writes:

> There can be no doubt that in by far the majority of industrial operations —in doing muscular labor, in work involving mental strain, and in light repetitive and monotonous work—the efficiency of a spell of work which exceeds four hours can be improved if divided into two halves separated by a few minutes' pause. Again and again, workers have testified to their appreciа-

tion of an organized, general rest interval. Their boredom and fatigue are relieved; their unpleasant phantasies (if present) are removed. The work curve is not only raised in *height* but also improved in *form* (*22*, 64).

The introduction, then, of appropriate rest periods into the day's work period appears to possess considerable value as a device for increasing efficiency. Where they are judiciously employed—that is, where they are neither too infrequent nor too long—increase in production results. If they are too infrequent, fatigue becomes heightened. Where they are too long, the individual experiences the inertia which commonly characterizes the beginning of a work period.

No small amount of fatigue may be attributed to an unnecessary waste of energy through lost motion. Several interesting studies have been made upon this problem of the reduction or elimination of unnecessary movements in the performance of some task. Each movement made in carrying out some task requires both time and energy, and we assume that the fewer the movements made, the greater the degree of efficiency. This does not mean, however, that the quickest movements are the most efficient since very quick movements may be the most fatiguing in the end. In the determination of the nature of the most efficient behavior pattern in any given task the motion picture has played an important part. The action patterns of many men, each an expert in his field, may be viewed. These may be compared with pictures of the work of inexpert men to make clear the differences. The motion picture machine may also be used to show the progress made from time to time by workers in dropping out useless movements. Photographic records of the worker's movements obtained by attaching small lights to the moving hands give an understanding of the type of errors made and the degree of improvement shown in their elimination. As an illustration of the use of this method, we give the following form Myers.

One of the most important principles of movement study is to avoid a needless number of separate angular movements, instead of combining them into a single uninterrupted sweeping circular movement. This principle was first studied by photographing the movements of an electric glowlamp attached to the worker's hand, in the chocolate-covering and sweet-dipping department of a confectionery factory. The same results as those just mentioned were obtained—an easier, rhythmical action performed with far less effort and fatigue, and a considerably increased output. Indeed, so much easier seemed the newer method in the sweet factory that visitors, introduced first to a room in which the old methods were maintained and next to the room in which the new workers had been trained to the better methods, were convinced that the workers in the former room were working far harder, despite the fact that

their output was considerably less; and several workers were reluctant to make use of these new methods because "they felt that by so doing they would not be working as hard as they ought to." By the introduction of such methods in the process of sweet-dipping, the worker being instructed to carry out a simple wider circular movement instead of stopping the arm twice and changing the direction of movement, an average increase of output amounting to 27.1 per cent was obtained. The investigator describes how after three months' training in these principles in a better lighted and ventilated room provided with more suitable tables and trays, "the workers were, on the average, producing 88 per cent more than the workers of the same standing who were working on the old method in the original room. . . . Girls of 14 or 15 were earning a sum equivalent to that earned by girls of 18 in the old room" (*22*, 91).

One of the most outstanding studies upon the reduction of the number of movements required to perform a task through the elimination of all unnecessary motions was made by Gilbreth on brick laying. The method of laying a brick, as ordinarily practiced, involved eighteen separate motions. Some of these were clearly useless. For instance, the pile from which the mason took a brick was placed at such a distance that he was forced to take a step out for each brick and a step back to the wall. Under the new way, both bricks and mortar were placed on a table so adjusted as to eliminate walking and as far as possible all unnecessary stooping. In addition, each brick was placed on the table by an unskilled laborer in such a way that it was merely necessary for the mason to lift it and place it on the wall. As an immediate result of this study, Gilbreth found that the actual number of the movements was reduced to five. With this simplified pattern the number of bricks laid per hour was increased from 120 to 350 without any apparent increase in fatigue.

Tests of Fatigue. The tremendous and far reaching effects of fatigue have long been known. Before any attempt was made to study the problem systematically, many literary descriptions had been given of those changes in behavior which are to be attributed to fatigue. It has been recognized that under continued fatigue the whole tone of man's life may change. Inhibitions previously maintained tend to disappear; the individual's emotional nature undergoes a startling transformation; his point of view changes—things which were worth while become trivial, things which were trivial now take on exaggerated significance. The individual may fly into a rage over nothing, or transgress moral codes long upheld. Everyone is generally acquainted with the common sight of the "cross" behavior of the fatigued child. Many, too, have seen adult behavior patterns change under fatigue. They have seen man's moral fiber break down. They have seen men do things while

suffering under fatigue toxins that they most likely would not have done when unfatigued. Prolonged fatigue, it is alleged, is one of the major contributory factors in the use of alcohol, for through its use comes a temporary release from the deadening drag of extreme weariness.

Within recent years various attempts have been made to determine the degree of fatigue; that is to say, to measure it. Studies conducted *in psychological laboratories* have sought to attack this problem either *directly* by determining the quality and quantity of achievement in psychological tasks; or *indirectly* by securing a measure of ordinary psychological activities such as perceptive discrimination or rate of tapping, which are assumed to be affected by fatigue even though such functions have not been directly exercised. In the direct tests, use is made, for example, of such criteria as the number of errors in dictation under continued work, the number of problems of a mathematical sort which are solved, or the time required for solving. In each case measures secured upon some performance when the individual is unfatigued are compared with others obtained when the individual is assumed, because of prolonged exercise, to be fatigued.

As an illustration of the direct method, we wish to refer briefly to an experiment by Arai. After a considerable period spent *in practice* in order to avoid subsequent effects of this nature in her real test, Arai began her experimental series which consisted in multiplying mentally four place numbers by four place numbers; *e.g.*, 2691 by 4385. From 11 A.M. until 11 P.M. on each of four consecutive days she multiplied as rapidly as she could, carefully noting the time required for the solution of each problem. Here was a rigorous task and a careful method of determining any decrease in efficiency. What were the results? In general, she found at the end of a period of 12 hours marked by continuous work that her efficiency measured in terms of the *time* required to solve problems was reduced about 50%. The following table shows perhaps more clearly the marked decrease in efficiency at the end of 12 hours of labor. Here is given the average time of solving the *first* and *last* two groups of 4 problems each.

TABLE XX

	First Day	Second Day	Third Day	Fourth Day	Average
First 8 problems	46.9 Min.	45.2 Min.	35.8 Min.	46.1 Min.	43.9 Min.
Last 8 problems	101.1 Min.	96.4 Min.	99.1 Min.	78.5 Min.	93.8 Min.

In the indirect methods in the laboratory, use has been made of the ability to discriminate, at varying times of the day, between two points

(two-point threshold) applied to the skin prior to and following performance upon given tasks. In addition, use has been made of such criteria as changes in reaction time and in rate of tapping, in respiration, and in circulation under continuous performances.

Attempts have also been made *in the factory* under actual working conditions to secure some measure of fatigue by considering the *quality* and *quantity* of work done at various intervals during the working day and week. The assumption is that more accidents occur and more breakage or spoilt work is turned out under conditions of fatigue than during unfatigued states. Also less actual work is accomplished. If a close connection between decrease in output and increase in number of accidents and spoilt work appears, there is presumptive proof of heightened fatigue. The fatigue is the causal agent. Figure 44 shows a regular rise in the number of accidents presumably due to fatigue during each work period. There is also a drop in output during these same hours. The period of less output is the period marked by a larger number of accidents.

OTHER FACTORS AFFECTING EFFICIENCY

We have reviewed the more outstanding phases of fatigue. It is, we assume, one of the major determining conditions of inefficiency. There are, however, certain other factors largely extra-organic in character, which at times affect man in his work. Just as fatigue may decrease his ability to achieve, so likewise various other conditions such as drugs, improper ventilation, weather, and climate may adversely affect his performances. The drugs which we shall consider here belong to two classes; *viz.*, depressants and stimulants. Among the former we may list alcohol, ether, and chloroform. Among the latter, we mention such as nicotine, caffeine, and strychnine. Of these, we wish to write only of alcohol, nicotine, and caffeine.

Alcohol. That man has discovered in alcohol a temporary way out of his many troubles is attested by its almost universal employment. Through it his cares are banished, and in their stead flows a feeling of well-being, or of bodily comfort. The organic basis of such feelings consists largely, according to McDougall, in the flushing of the skin with blood that abolishes all sense of chill and a "blunting of the sensibility to small aches and pains and a thousand hardly distinguishable sense impressions which except in those in perfect health, contribute to tip the balance of bodily feeling-tone to the negative or unpleasant side" (p. 68).

McDougall[1] has described three groups of symptoms which charac-

[1] McDougall, W., *Outline of Abnormal Psychology*, p. 68. Scribner's Sons. 1926.

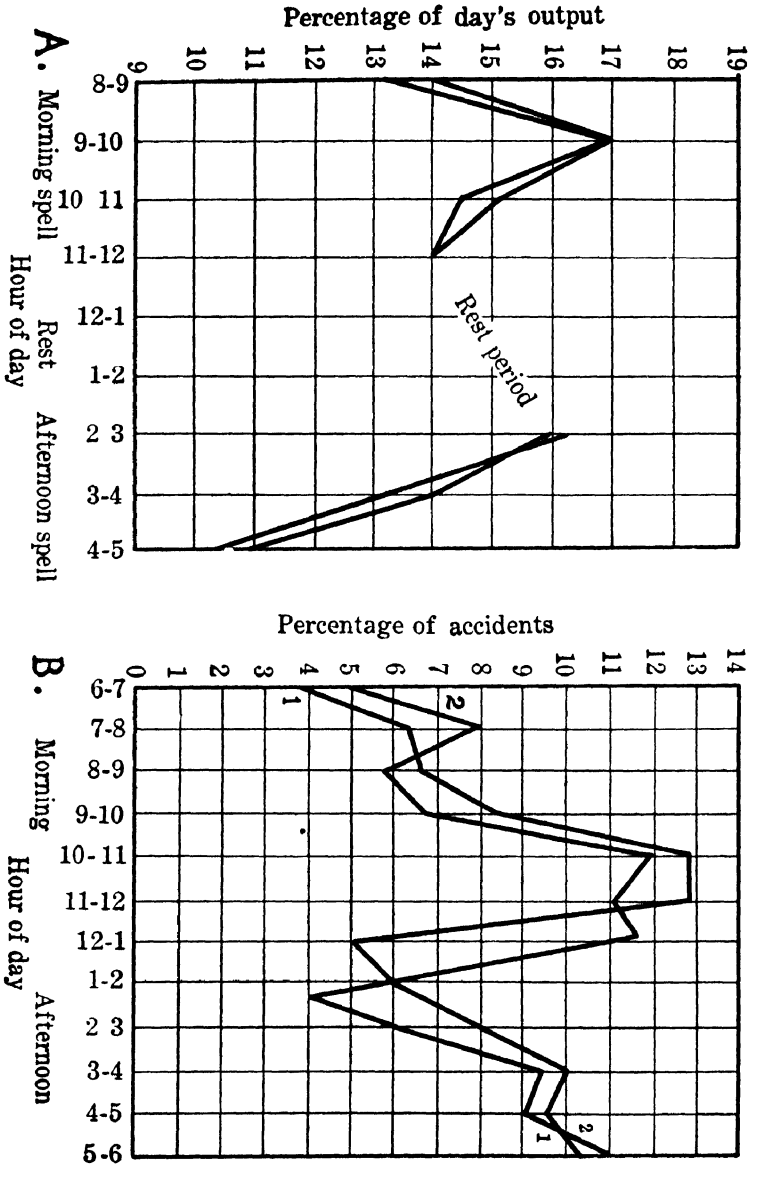


FIG. 44. A. Typical distribution of output over the working day. Here is shown the fall from 10–12 and from 3 on. B. The time of occurrence of industrial accidents. (1) Germany, (2) England. Note the increase in the late morning and afternoon periods. Adapted from Muscio.

terize the progressive attack of alcohol upon psychological patterns of the individual. In addition to the feelings of well-being and comfort other symptoms of the first stage are as follows:

The drinker's conversation and actions become less restrained; all his emotional responses are freer and fuller than in his normal state. He laughs and smiles more readily, he grows more easily angry or tender, elated or depressed, scornful or compassionate, according to the appeal of the moment. Perhaps the absence of the various emotional states into which fear enters as an element, and which we denote by such names as anxiety, worry, care, despondency, is explicable on the principle that we apply, namely, that alcohol successively weakens and suspends the hierarchy of functions of the brain, and therefore of the mind, in the order from above downward; that is to say, in the inverse order of their development in the individual and in the race. For the emotional dispositions or capacities are a very ancient racial endowment and have their physiological seats in the basal ganglia, the lowest levels of the great brain, the part which alone is represented in the brains of the lower vertebrates. The higher intellectual faculties, on the other hand, are the latest acquired, and are connected with the anatomically highest and last developed parts of the brain. Intermediate between these come, in the order of development, the sensory and the skilled motor functions (and their nerve-centres).

Now, of all the intellectual functions, that of self-criticism is the highest and latest developed, for in it are combined the functions of critical judgment and of self-consciousness, that self-knowledge which is essential to the supreme activity we call volition or the deliberative will. It is the blunting of this critical side of self-awareness by alcohol, and the consequent setting free of the emotions and their instinctive impulses from its habitual control, that give to the convivial drinker the aspect and the reality of a general excitement.

The second stage is that in which the functions of the intermediate level, sense-perception and skilled movement, are invaded and disturbed. The drinker begins to show a certain clumsiness of behaviour. If he is self-observant, he notices that he is liable to make ill-adjusted movements; on setting down his glass, it makes a more violent contact with the table than he had intended; on rising, he may stumble against a chair, perhaps upsetting it; on lighting a cigarette, he may break the match which he essays to strike; in speaking, he may slur a word or drop an "h." Each such little mishap will at first be quickly rectified; for each one may evoke the power, possessed in some degree by all and to a wonderful degree by many men, of temporarily correcting, by an effort of concentration or self-control, the paralysing effects of the drug.

At this stage also his perceptions are impaired. His field of sense-observation is narrowed; the several senses work in relative isolation from one another; the fineness of his ear, of his taste, his touch, his vision is blunted; he may momentarily see objects doubled, and become relatively indifferent to heat and cold, to the flavour of his food and the aroma of his wine, to the glare

of the lights, the strains of the music, and the stridency of his own or his neighbour's voice. The impairment of his intellectual functions, being further advanced than in the first stage, and the functions of the third or lowest cerebral level, that of the emotions and instinctive impulses, being still relatively intact, he is apt to give way to clumsy but violent displays of emotion characterised by the exclusive dominance of each primary emotion in turn; he passes quickly from anger to affection; from boisterous merriment to tears, from elated boasting to despondency, each emotion being unrestrained and unmodified by that blending of other emotions which expresses the reaction of the intellectual faculties upon them.

In the third stage the intellectual processes of judgment and self-criticism and control are virtually suspended; the functions of sense-perception and skilled movement are grossly impaired, and the emotional tendencies themselves are invaded and weakened, so that only strong appeals to them suffice to evoke any response and, in their absence, the drinker sinks inert and nerveless into a heavy sleep, which lasts until the alcohol absorbed has all been oxidised (*20*, 71, 72).

Men use alcohol, then, because of a number of reasons—to forget troubles and worries, to secure relief from physical suffering, to overcome strong feelings of inferiority, to escape from an inhospitable environment, or to obtain relaxation from social pressure. Patrick, for instance, has maintained that in a great number of cases the use of alcohol is due to a strong desire to find relaxation. It is a way of retreat from the too stern realities of life. Man is not strong enough nor efficient enough to continue to face things as they are. He cannot do his very best and then allow matters to stand. He rides away, for a time at least, from all troublesome affairs on a drink of whiskey. Some would say that the man who drinks in the face of great difficulties is not likely to commit suicide. Put differently, we might say that some men get drunk, while others commit suicide.

It is seldom, indeed, that a man actually believes that he drinks to increase his efficiency. On the contrary, when a *clear* head is absolutely demanded, he refuses drink. When he wishes, however, to *soothe* his intellect, to *dull* his fears, to *forget* his weaknesses, and to *heighten* his emotions, he finds an ally in the form of alcohol. "The timid (individual)," writes Hollingworth, "with restraints removed by alcohol becomes eloquent, conducts his conversations, his wooing, his fighting, with fewer constraints and inhibitions."

Nicotine. Nicotine, an alkaloid compound, is quite poisonous. Like other toxins its use decreases the efficiency of the *non-smoker* and so sets the continual smoker that the absence of the drug results for a time in a serious impairment of his daily behavior patterns. When

introduced into the blood stream—*e.g.*, through smoking, it produces widespread and pronounced effects upon organic and psychological functions. It accelerates the heart, contracts the blood vessels, and increases the blood pressure. It interferes with behavior patterns by lessening the accuracy of movements both of a finer and of a grosser sort.

Various experimental attempts have been made to learn whether nicotine (in smoking) has a deleterious effect upon those abilities which determine academic status. The usual claim is that smokers are not so efficient in their studies as non-smokers. The following table gives some results obtained by Taylor in a comparative study of smokers and non-smokers in terms of grades made in school subjects. Other studies show somewhat similar results. Much the same sort of thing is supposed to hold for academic honors. One investigator has reported that in a group of about 200 students composed approximately of an equal number of those who smoked and those who did not, 18% of the former and 68% of the latter won academic honors. Another found that only 5% of a group of 150 high honor students (Yale) were smokers.

TABLE XXI

	Age of Students					
	12	13	14	15	16	17
	Grades					
Smokers	73	75	73	75	75	68
Non-smokers	83	90	89	84	87	85

It should be recognized that such differences as these in academic achievement are not necessarily to be attributed directly to the effects of smoking. It may well be, as some have maintained, that smokers are more social than non-smokers. They are inclined to spend less time than non-smokers in study. Concerning those studies which have found a significant relation between grades and smoking, Conklin writes:

The most that can be safely said concerning these studies is that smoking habits and lower grades are usually associated. It cannot be said that tobacco is the cause of the lower grades. Studies of the intelligence test scores of smokers in comparison with non-smokers do not reveal any startling difference, some have even indicated a slightly higher score average for the smokers. The reason for the association of smoking and lower grades is probably to be found in the home influence, the general social situation, and the personality type of the individual. The boy with introvertive tendencies who does not

mix readily with others might be far less likely to acquire the tobacco habit than the boy with extravertive tendencies who belongs to a string of societies and fraternities. Likewise the boy with introvertive tendencies might have more time to apply to his lessons than the boy whose time is absorbed by his social obligations (5, 374).

The influence of nicotine (through smoking) upon the efficiency of psychological abilities has long been an interesting topic. Among the many who have investigated the problem, we can refer only to the work of Bush. Bush tested such abilities as speed of perception, free and controlled association, memory and imagery, and calculation. Fifteen of his subjects were, and two were not, accustomed to smoking. His procedure consisted in giving the tests, then waiting for a period of fifteen minutes while the subjects smoked and then again giving the tests. The following table gives the results for the 17 subjects upon ten tests. One individual (control) did not smoke, and one smoked non-tobacco (cubeb) material. Minus and plus signs indicate decrease or increase in achievement following smoking.

TABLE XXII

PSYCHOLOGICAL EFFECTS OF SMOKING

TESTS	TEST GROUP		Control (1)
	Tobacco (15)	Cubeb (1)	
(1) Speed of Perception	—17.1	— 6.8	+ 3.4
(2) Free Association	— 8.7	—20.5	+ 0.2
(3) Controlled Association	— 8.0	—16.3	+ 1.6
(4) Controlled Association	—14.1	+ 5.5	+ 1.0
(5) Controlled Association	—12.4	+ 1.9	+ 5.4
(6) Visual Memory	— 2.9	0.0	0.0
(7) Auditory Memory	— 4.3	+ 1.4	— 4.9
(8) Imagery	—22.2	—14.3	+18.3
(9) Addition	— 9.4	+ 9.4	+ 1.0
(10) Subtraction	— 6.7	— 0.8	+ 2.7

Caffeine. Caffeine, a drug that acts largely as a stimulant, is found both in tea and in coffee. Its general organic effects have been widely investigated. We owe one of the most elaborate studies to Hollingworth. His results are peculiarly significant in that they were gathered over a fairly long period of time—almost one and one-half months—from individuals who were, in several respects, controlled during the entire period of study.

The general conclusions from this, as well as other controlled studies, are interesting. Tests for motor coördination, for example, show that

small doses of caffeine have a stimulating, while large doses have a depressing effect. A small dose (equivalent to a cup of coffee) increases the speed of typewriting, and at the same time decreases the number of errors. Larger doses (4–6 grams), however, decrease efficiency in rate of typing but not in number of errors. Doses of moderate size produce tremor, which disappear only after several hours. Heightened efficiency lasting over several hours appears in the facility of associative recall.

Many people complain of sleeplessness after drinking coffee. Small doses (1–4 grams) apparently do not cause sleep disturbances. But if coffee is taken at a late hour of the day or on an empty stomach sleep disturbances may occur. People of considerable weight are somewhat less influenced by caffeine. Hollingworth reports that some of his subjects who had less bodily weight than others were inclined toward headaches, dizziness, feverishness, and irritability.

Ventilation. It has long been recognized that when individuals are crowded into poorly ventilated rooms of fairly high temperature, certain physical and psychological changes occur. The skin becomes flushed, hot, and sweaty. Feelings of drowsiness and lassitude slowly appear, usually accompanied by a throbbing headache. Concentration becomes increasingly difficult, and the ability to work lessens. Under a change in ventilation, such symptoms disappear. Not infrequently under such conditions an individual in a half-fainting state may be quickly revived by vigorous fanning. The normal individual has repeatedly observed the increase in alertness and bodily comfort that comes from the use of a fan in hot, close quarters.

Only within recent years have experimental attempts been made to determine the nature of the immediate environmental causes of the bodily distress and the loss in efficiency under improper conditions of ventilation. Instead of confirming the common notion that such symptoms as discomfort, lassitude, and headache were directly attributable to a decrease in the oxygen and an increase in the carbon dioxide content of the air, experimental studies have shown that the trouble lies largely or wholly in the temperature of the air. The inability to work efficiently in poorly ventilated and hot places is not due to the rebreathing of poisonous materials thrown off by the lungs. It is due, on the contrary, to an increase in the temperature of the body beyond the normal or optimal degree. The cause in such cases is physical—not chemical. The headache, drowsiness, and the like are nature's warning signals that the regulatory mechanism of the organism by means of which the bodily temperature (generated as a by-product of metabolism)

is maintained around 98° is not functioning properly. It is allowing the temperature of the body to creep up. Normally, excess temperature of the body is removed by radiation from its surface. The capillaries of the skin dilate, allowing more blood to reach the outer regions with a consequent loss of some of the excess temperature. The skin thus charged with blood gives the characteristically flushed appearance of the person in a hot, "stuffy" room. Under ordinary conditions evaporation or perspiration serves to remove much of the excess bodily temperature. Where the humidity is great—that is, where the air has an unusually large water content—very little perspiration evaporates, and the temperature increases. The individual, in a way, "runs a fever." And just as fever gradually destroys the organism, so does the heightened temperature under the conditions of a hot, improperly ventilated room begin its work of organic destruction.

The realization of the salutary influence which proper working conditions have upon efficiency has brought many experimental studies upon this problem of ventilation. One of the most outstanding was done by Thorndike and others at the laboratory of the New York State Commission on Ventilation. Here in a small, air-tight chamber, tests could be made upon human beings under environmental conditions in which the oxygen and the carbon dioxide content of the air, temperature, and the humidity were controllable. Individuals could be placed in the experimental room and allowed to breathe the air of the room, or they could breathe fresh air drawn through pipes from the outside. They could also be placed outside the room in fresh air but made to breathe the "vitiated" air of the experimental room through pipes.

Some interesting results were secured from these studies. It was found that marked bodily discomfort might be clearly experienced by the individual in the experimental room although he was breathing fresh air drawn from outside the room. Placed on the outside, however, such distress disappeared although the subject continued to breathe the air of the room which he had just left. Discomfort, under the former set of conditions, could not possibly be due to any deprivation of oxygen or to an increase in carbon dioxide of the air of the room, since the air breathed through pipes was quite normal. Under the latter conditions, while breathing vitiated air from inside the room, no distress was experienced. Moreover, it was shown that the use of air currents within the experimental room removed bodily discomfort although no other changes (addition or subtraction) were made.

Studies upon such environmental conditions show that the optimal conditions for *physical* work consist of a temperature of 68° F., a rel-

ative humidity of 50%, and 45 cubic feet of fresh air per minute. Fresh air in the ordinary meaning is air in which there is approximately 21% of oxygen, 78% of nitrogen, and 0.03% of carbon dioxide. A fairly slight change in temperature above the optimum; that is, a change from 68° to 75°, considerably reduces efficiency, where heavy, *physical* labor is done. It has been shown that fifteen per cent more work of this sort is done at 68° than at 75°, and 37% more than at 86°. But when *mental work* is considered, less dependence upon temperature and humidity is found. Mental efficiency is apparently less affected by environmental changes than is physical efficiency.

Concerning his studies of the relation between *mental* work and "air conditions" (ventilation), Thorndike writes:

With the forms of work and lengths of period used, we find that when an individual is urged to do his best he does as much, and does it as well, and improves as rapidly, in a hot, humid, stale, and stagnant air condition (86° F., 80 per cent. relative humidity, with no air or only re-circulated air, and with no movement of the air save what is caused by events in the room and, in the case of re-circulation, by the re-circulating force) as in an optimum condition (68° F., 50 per cent. rel. hum., 45 cu. ft. per person per minute of outside air introduced). This result was obtained when the individuals were subjected to the bad conditions 4 hours a day for five consecutive days. Enough individuals were tested to make the result entirely reliable.

We find further that when an individual is given work to do that is of no interest or value to him and is deprived even of means of telling how well he does it, and is in other ways tempted to relax standards and do work of a poor quality, he still shows no inferiority in the quality of the product produced in stagnant air at 86°, 80 per cent. r. h., with 30 to 40 parts of CO_2 per 10,000, he being subjected to this condition for 8 hours a day for four successive days, and tested on the second, third, and fourth day. There is some evidence that he spends more time on the work, but even this is not certain.

Finally, we find that when an individual is left to his (or her) own choice as to whether he shall do mental work or read stories, rest, talk, or sleep, he does as much per hour when the temperature is 75° as when it is 68°. In the experiments on this topic, temperature alone was varied, other air conditions being kept constant. The reason for this limitation was the apparent absence in all experiments to date, of any physiological effect due to staleness of the air as shown by high CO_2 content. The smaller difference was chosen to make the experiments suitable for their main purpose as a test of certain conditions upon appetite, the psychological tests being in this case secondary. It is also the case that the effect of moderate overheating upon the inclination to do mental work is, in practice, more important than the effect of extreme heat. The two conditions (68° and 75°) were maintained each for three successive days of seven hours each.

In a very short experiment wherein the temperature was varied to 86° F., 80 per cent. rel. hum., there did seem to be a diminished inclination to do mental work, but the variability of results in all such experiments with optional work advises us to postpone any conclusions concerning the effect of very high temperatures upon inclination until adequate experiments are made (*31*, 75).

Climate, Weather and Season. It is difficult to draw a distinction between climate and weather. We shall assume that the primary distinction is one of "duration." We may say with Mark Twain that "climate lasts all the time and weather only a few days." Both climate and weather involve essentially five factors: namely, temperature, humidity, barometric pressure, wind, and precipitation.

Almost without exception the great mass of evidence which has been gathered upon the subject reveals the rather intimate dependence of man's psychological nature upon climate, season, or weather. We recognize that such descriptive terms as depressive, bracing, deadening, and exhilarating have long been applied to the weather. We know that the fortunate go south in winter and north in summer in order either to work or to play the better. We agree that we cannot think efficiently on muggy days, and we say that days marked by high winds leave us irritable and unable to work. Huntington writes:

> For a while such stimulation (high wind) is probably beneficial, but if continued day after day it makes people excitable and cross. A striking example of the effect of a prolonged wind is seen in eastern Persia in the basin of Seistan. During the summer, from June to September, the so-called "Wind of One Hundred and Twenty Days" blows violently from the north. . . . When Europeans have to endure this wind they say that it is one of the most trying experiences imaginable. Not only does it render them irritable, but it deadens their initiative and makes them want to stay idly in the shelter of the house. The natives, although possessed of many good qualities, are inert and inefficient even in comparison with their fellow Persians who live farther to the north and west. On the whole, we may probably conclude that occasional short-lived gales and frequent light or moderate winds are beneficial, while long periods either of steady calms or of gales are depressing (*16*, 112).

Dexter cites statistical evidence to show that during periods marked by high winds the prevalence of suicide and murder in Denver, also of misdemeanors in the public schools (of Denver) ran up to six or eight times the normal (*7a*, 89).

Constancy in temperatures does not seem to be a desirable virtue of weather from the point of view of human efficiency. After remarking that "people do not work well when the temperature remains constant,"

Huntington adds that "changes in temperature are more stimulating than uniformity" (*16*, 119). Man seems at least to prefer fickle weather, provided the changes are not extremely large. He needs something, it appears, if nothing more than a change in the weather, to stimulate him.

Some would find the way to an understanding of much of man's greatness in the weather. In the extreme temperature—very hot or very cold—there is the deadening drag of monotony. In the tropics, for example, it is too hot to work; in the Arctic regions, it is too cold. Neither is stimulating. According to Dextér, the "inhabitants of hot climates are usually listless, uninventive, apathetic and improvident. An equable high temperature, especially if moist, weakens body and mind" (*7a*, 74).

Concerning this point of the stimulating effect of climate upon achievement, Huntington cites a very interesting comparison between British Colonists of the Bahamas and Canada.

> At the time of the American Revolution a considerable number of Loyalists were so faithful to England that they sacrificed their all in order to escape from the new flag with its stars and stripes. Leaving their homes in Georgia and other southern states they sought the British territory of the Bahamas. Other colonists came from Great Britain. Now, after from three to five generations, the new environment has had more opportunity than in South Africa to produce its full effect. Nowhere else, indeed, in all the world have people of the English race lived as genuine colonists for several generations in so tropical a climate. What has been the result? There can be but one answer. It has been disastrous. Compare the Bahamas with Canada. The same sort of people went to both places. Today the descendants of the Loyalists in Canada are one of the strongest elements in causing that country to be conspicuously well governed and law-abiding, and the descendants of other colonists, both British and French, vie with them in this matter. In the Bahamas the descendants of the same type of people show today a larger proportion of poor whites than can probably be found in any other Anglo-Saxon community. Although no figures are available, my own observations lead to the conclusion that the average white farmer is scarcely ahead of the average Negro. . . . In the quality of industry the difference between people in tropical and other countries is well known. Practically every northerner who goes to the torrid zone says at first that he works as well as at home, and that he finds the climate delightful. He may even be stimulated to unusual exertion. Little by little, however, even though he retains perfect health, he slows down. He does not work so hard as before, nor does the spirit of ambition prick him so keenly. On the low, damp seacoast, and still more in the lowland forests, the process of deterioration is relatively rapid, although its duration may vary enormously in different individuals. In the dry interior the process is slower, and on the high plateaus it may take many years. Both in books and in conversation with inhabitants of tropical regions one finds practical

unanimity as to this tropical inertia, and it applies both to body and mind. After long sojourn in the tropics it is hard to spur one's self to the physical effort of a mountain climb, and equally hard to think out the steps in a long chain of reasoning. The mind, like the body, wants rest. Both can be spurred to activity, but this exhausts vitality (*16*, 27, 41).

Dexter analyzed about 40,000 cases of *assault* with respect to the time of the year showing the greatest occurrence. From this survey, the results of which are graphically shown for both males and females in Figure 45, we find that beginning with January, the coldest month, a steady rise occurs in the number of crimes listed month by month until

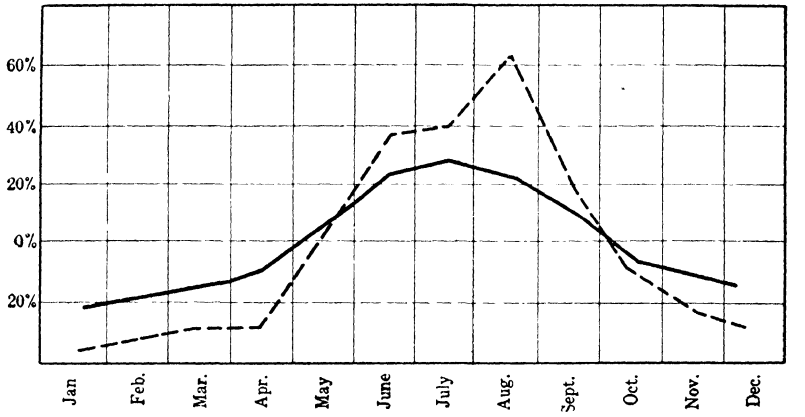


FIG. 45. Relation between temperature and crime. Assault and battery. Male ——; female..... From Dexter, *Weather Influences*.

we reach midsummer. After the peak of hot weather has been passed, the decline is as steady as the previous increase. More crimes against persons occur, then, during the hottest months, while more crimes against property occur in winter. "One must conclude," Dexter points out, "that temperature, more than any other condition, affects the emotional states." Because persons are more emotional in summer, they are more inclined to attack others. Men commonly hold the notion that they fight because they want to fight, but evidence of the sort advanced by Dexter leads one to believe that men may fight largely because of the weather. That is to say, the primary contributory cause is high temperature.

Man is a complex organism set in a very complex environment. His activities are determined by the nature of his organism and the environment. Within limits, man is able to proceed relatively unaffected by changes within his environment. He is, we say, self-sufficient.

There comes a time, however, when the environment becomes effective. It operates in many ways to produce fatigue; it colors his point of view; it interferes to a striking degree at times with his efficiency; and it upsets him emotionally. Man is, we say, what his "environment" lets him be. Given the proper environment the whole range of his activities is broadened, his behavior is energized, his efficiency increases. Denied an environment of this sort, man's life grows narrow, his behavior lacks drive, his efficiency suffers. He creates in imagination or relives in memory the sort of environment in which his activities find fullest expression. Many of us no doubt can dimly sympathize with Kipling's English soldier who "back home" after long years of oversea service finds that the only truly satisfying *environment* is

> ". . . somewhere east of Suez
> Where the best is like the worst
> Where there ain't no ten commandments
> And a man can raise a thirst."

BIBLIOGRAPHY

1. Arai, T., *Mental Fatigue.* Columbia Uni. Contributions to Education. *54,* 1912
2. Bingham, W., "Measures of Occupational Success," *Harvard Bus. Rev.,* 1926.
3. Burt, H., *Employment Psychology.* 1926
4. Bush, A., "Tobacco Smoking and Mental Efficiency, *N. Y. Med. Jour.,* 1914, *99,* 519
5. Conklin, E., *Principles of Abnormal Psychology.* 1927.
6. Dexter, E., *Weather Influences.* 1914.
7. Drever, J., *The Psychology of Industry.* 1921.
8. Gilbreth, F., *Motion Study.* 1911.
9. Griffitts, C., *Fundamentals of Vocational Psychology.* 1924.
10. Harrison, H., *Industrial Psychology.* 1925.
11. Hollingworth, H., *Vocational Psychology and Character Analysis.* 1929.
12. ————, *Vocational Psychology.* 1916.
13. ————, *Judging Human Character.* 1923.
14. ————, "Variations in Efficiency during the Working Day," *Psychol. Rev., 21,* 1914, 473.
15. ————, and Poffenberger, A., *Applied Psychology.* 1920.
16. Huntington, E., *Civilization and Climate.* 1915.
17. Kitson, H., "Scientific Method in Job Analysis," *Jour. of Pol. Econ., 19,* 1921.
18. Lee, F., *The Human Machine and Industrial Efficiency.* 1918.
19. ————, "The Nature of Fatigue," *Pop. Sci. Mo.,* 1910, *76,* 182.
20. McDougall, W., *Outline of Abnormal Psychology.* 1926.
21. Myers, C., *Mind and Work.* 1920.
22. ————, *Industrial Psychology.* 1925.

23. Morgan, J., "The Effects of Sound Distraction upon Memory," *Am. Jour. of Psych.*, 1917, *28*, 191.
24. Muscio, B., *Lectures on Industrial Psychology.* 1920.
25. Patrick, G., *The Psychology of Relaxation.* 1916.
26. Rivers, W., *The Influence of Alcohol and Other Drugs on Fatigue.* 1908.
27. Scott, W., *Increasing Human Efficiency in Business.* 1911.
28. Snow, A., "Tests for Chauffeurs," *Indus. Psych.*, *1*, 1926.
29. Taylor, W., *Principles of Scientific Management.* 1915.
30. Taylor, F., *Shop Management.* 1911.
31. Thorndike, E., McCall, W., and Chapman, J., *Ventilation in Relation to Mental Work.* 1916.
32. ———, "Mental Fatigue," *J. of Ed. Psych.*, 1911, *2*, 61.
33. Watson, J., *Psychology from the Standpoint of a Behaviorist.* 1919.

CHAPTER XII

ADVERTISING AND SALESMANSHIP

INTRODUCTION

We have reviewed two outstanding groups of problems of an industrial nature; *viz.*, (1) the selection of the right individual for a job, and (2) some conditions which affect individual efficiency. As far as these problems deal with industry, they are chiefly concerned with matters of production of goods and materials. We must now consider for a moment the general problem of inducing the public to buy the product. Here fall the specific problems of advertising and of marketing goods, of establishing effective contacts between the producer and the consumer. These are economic matters, but they are likewise psychological. It shall be our task to discuss the psychological nature of the problems in these fields.

It seems almost unnecessary to point out that advertising, for instance, has its purely psychological side. Every one recognizes that the human individual experiences needs, desires, or longings for food, clothing, shelter, and a host of other materials. Under proper conditions the expression of these desires and wants converts the man in the street into a consumer or a buyer of wearing apparel, food, and motors. Moreover, desires and longings for a particular article may be created or heightened by the producer in order to increase the sale of that article. Furthermore, feelings of confidence must be aroused before individuals can be induced to purchase an article to any significant amount. Elaborate appeals, for instance, may be made to prospective buyers under the guise of testimonials by those persons who claim to have derived satisfaction from the use of some article. Recommendations of articles by famous personages describing the value of various commodities are presented to the public which does not stop to question how such recommendations were secured, but which is duly impressed by the fact that a famous individual should make use of an article of this sort. Buying behavior is released.

NATURE AND PROBLEMS OF ADVERTISING

For a number of years this country has cocked a querulous eye at advertising. People have wondered about it, rebelled at it, marvelled at it, derided it, analyzed it, debated and conferred about it—and read it. Advertising has

argued with them in their magazines and their newspapers, shouted at them from posters, twinkled at them from electric lights, stared at them from car-cards, beckoned to them from shop-windows (7, 1).

In a broad sense, advertising is much like propaganda or the weather —it may touch every phase of the individual life. No one is wholly free from the influence of advertising. The food he eats, the clothes he wears, the car he drives, the fraternal organization to which he belongs, and the church in which he worships may all reflect the touch of advertising. For instance, we recall seeing a large signboard set up before a tiny church in a small mountain village in Arizona, which bore this amusing legend, "Worship here—there is no monkey business in this church."

Advertising, as it is considered in a fairly restricted sense, applies to commercial advertising. It may be defined as the presentation of a proposition to the people in such a way that they may be induced to act upon it (Starch). It is a serious attempt to control the behavior of the prospective buyer. It seeks to establish associations between certain goods and the satisfaction of human wants, so that the appearance of the want is signalized by an urge to secure certain goods. It is obvious that the goods which satisfy the most insistent wants or the greatest number of wants are the most widely demanded. Producers deliberately strive through advertising to create or to heighten a want or a desire for articles which they are desirous of marketing. They realize that only in this manner may they expect a wide and insistent call for their goods.

Kinds of Advertising. Advertising occurs in many forms. In each, enormous sums of money are spent annually. Figure 46 gives a list of the more important mediums of advertising and the estimated amount spent in each during a one-year period (1919–20). Here we find the stupendous sum of $1,304,000,000 spent for purposes of controlling the buying activities of the public. Approximately one-half of this total amount went to the newspapers. A fourth was spent in direct advertising.

All forms of advertising may be grouped roughly into two classes: General publicity and Educational. While both are to a certain degree commercial, the latter is more truly so. Under the former, we might place the activities of all those agencies the primary goal of which is extolling the merits of some person, institution, or locality. Stars and universities, for example, must have their publicity agents whose duty it is to see that the public is brought to look favorably upon the one or the other. Each finds need of publicity.

Under educational advertising we must list those advertising appeals which are made widely and fairly indiscriminately to the masses at large. Here we can but mention such mediums as the magazines and newspapers, highway signs of all sorts, window displays, street car signs, and motion picture advertisements. Under the class of educational

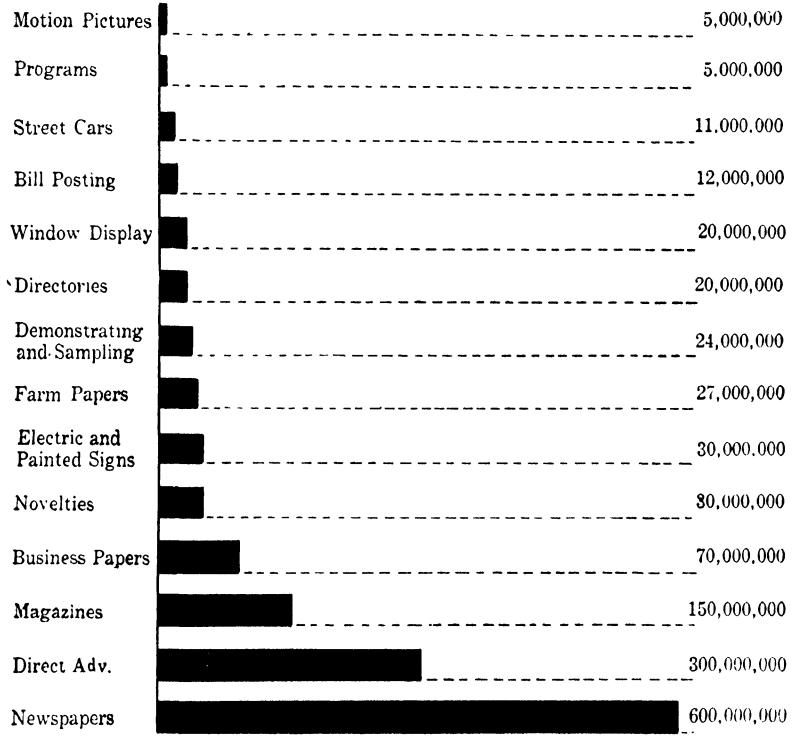


FIG. 46. An estimate of the total amount invested in all forms of advertising during the year of 1919–20.

advertising we must also set down the form which appeals only to the members of a certain class who use or who can use some product. Here we include the mail order catalogues, the personal letters, the descriptive booklets, the folders, and the like. This form of advertising is not directed toward the mass of the public at large. On the contrary, it is private. In some cases it may be quite private and appeal to a very small number of persons, as in the case of the advertisement of a sale of antiques or of rare jewels. It may appeal, however, as in the case of some of the large mail order houses, to millions of individuals. Even here selective appeal exists—the catalogues go to persons who write

for them, to old customers, or to those whose names have been submitted by customers.

All advertising, we see, is truly concerned with problems of initiating and controlling human responses. It aims to initiate buying behavior. We could arrange our whole discussion under the topic of releasing the desired response of buying. On the other hand, we recognize that every action must be linked up with perception, memory, or imagination. There can be no buying unless an individual faces some situation which initiates activity. We shall accordingly divide the following discussion of advertising into a first part, in which we shall deal with the problem of creating the desired impression, and into a second part, where we shall be concerned with the problem of releasing the desired response.

Creating the Desired Impression. The effectiveness of any form of advertisement must depend primarily upon the degree to which it "appeals" to the consumer. The proper kind of impression must necessarily be made in order that the advertisement may function; that is, produce the desired response. We recognize, in general, that an appeal may be made to an individual largely by virtue of certain characteristics of the advertisement—by its color, size, position, and repetition. These may be called "objective" characteristics. An appeal may be made, however, in terms of the cheapness, durability, reliability, healthfulness, and practicality. These depend more upon the attitude of the individual, upon his standards of price, quality, and living. They may be called "subjective" characteristics. In both cases the appeal is to the organism which is set, either racially or individually, to be affected by characteristics of the advertisement. In the former case, we are racially set, for instance, to attend to objects which are brightly colored, which are in movement or which are very intense. In the latter case, if we are poor, or very frugal, we are set to look to the cheapness of an article; if we are in ill-health, we are set to attend to those things which promise health; if we desire to improve our physical appearance, we are set for those advertisements which offer ways of heightening the charm of our faces and our figures. We mean to consider first of all some of the above characteristics of advertisements by virtue of which they tend to be observed.

There are, we said, several features of a printed advertisement by virtue of which it tends to be perceived. Among these we mention the following: color, size, intensity, contrast, novelty, repetition, and position. We shall briefly consider each of these factors.

Color. Within recent years, considerable emphasis has been laid upon the use of color. During a period of 15 years, according to Kitson,

the percentage of colored advertisements in four magazines,[1] which he analyzed with respect to the one aspect of color, increased more than 20%. Color, we know, makes a subtle appeal to one's sense of beauty. By adding an esthetic and artistic value to the advertisement, color actually enhances its commercial value.[2] It commands greater attention.

It is generally recognized that employment of color brings heightened returns in advertising. We cite two illustrations (*18*) as evidence of this fact. A mail order house which annually sends out millions of catalogues made a test of the pulling power of color. It printed one page in color in half the catalogues and in black and white in the other half. The returns from the color page were 15 times as large as those from the black-and-white page. In another case a colored, instead of a black and white, background was used in a shoe advertisement. The price and quality of the article remained unchanged, but "the one printed in color brought approximately 30 times as many orders."

An interesting phase of the question of the use of color in advertising is the number of times each of the various hues is used. According to the outcome of one study, red, of all the colors, seemed to be used most frequently. It occurred in 77% of all advertisements in various magazines analyzed; brown appeared in 19%, blue in 8%, and green, orange, and yellow were found in 6%. The small percentage of blue is somewhat surprising since a number of students have pointed out that blue is a preferred color of men. The large percentage of red might be partly attributed to the fact that it is commonly held to be a favorite among women.

Colored printing has been shown to be somewhat less effective than ordinary black type. The former seems to be less legible; it is apparently not read so frequently. In this respect, the status of color is quite similar to that of white letters on a black ground. Neither is desirable.

Size and Intensity. The size of an advertisement is quite important. That which is big commands observation. Other things equal, the larger a thing is the more easily it is perceived. Because it is impressive, it gives the advertiser a better opportunity to bring his message before more people. Years ago there was apparently very little tendency to make use of large advertisements. Their value had not been realized. Today we may find a single advertiser taking as many as 5 or 6 full

[1] *The American, Collier's, Ladies' Home Journal,* and *Country Life.*

[2] A number of reasons have been given for the greater value of color over black and white in advertisements. Among others we note that color tends to give a desirable atmosphere—that is, it lends distinction to the article; it serves better to reproduce the article in a "life-like" manner; finally, it may be said to be more pleasing.

pages in a magazine (*Saturday Evening Post*) which reaches millions of people.

In the last forty years, the percentage of full page advertisements, compared with the total advertising space, has increased from around 20% to 75%. Here is but another aspect of industrial and commercial competition. Some individuals and concerns use large advertisements; because they do, others feel similarly obliged to do so. Moreover, producers have discovered that big advertisements actually bring results. In general, we may say that they possess more drawing power than smaller advertisements. Concerning this problem of the value of size of an advertisement, one writer remarks:

> Other things being equal, for general display advertising . . . the full-page unit is apparently the most economical space to use. It is evidently more economical than the smaller spaces and also more economical than double-page units. . . . Other factors, such as the nature of the product or the business may make it advisable to use larger or smaller space than the full-page unit, or than the unit which according to the general rule would be most economical. The conclusion suggested by some of the experimental investigators, that the attention value of space increases more slowly than space itself, that, in other words, small space is more economical in proportion to the area occupied than large space, is true apparently only in the case of advertisements of the classified type. And this is true only of certain types of classified advertising—for example, mail-order advertising—in which the attention is voluntary and the customer or reader is definitely interested in searching for a certain commodity and hence looks through all of the advertisements with great care. Small space apparently under such circumstances is more economical. The conclusion drawn by Hollingworth and others, that the number of inquiries or orders tends to increase as the square root of the amount of space used, would apparently hold only for this type of advertising and for the attention conditions here mentioned (*18*, 563).

By intensity we mean roughly the strength of color, or the blackness or the whiteness of advertisement. Very bright colors as compared with dull, washed out colors are more likely to be observed. Much of the striking quality of a colored advertisement is due to the intensity of the hues. When we turn from the printed page to brightly lighted billboards or electric signs, we better realize the significance of this factor. The organism is assailed by the brilliance of some advertisements. They tend to catch the eye and hold attention by virtue of sheer force and power.

Contrast and Novelty. Not infrequently an advertisement owes much of its attentive value to the spatial arrangement of the colors. Black and white are very commonly employed in this manner to produce

very striking effects. Blue and yellow may be used quite effectively in pairs to give a pleasing result—the saturation of each is heightened by the presence of the other. In contrast, it is generally desirable that the color of the object in the foreground be more intense than the color of the background. Other means of inducing contrast effects consist in the use of blank white spaces, circles, curves, unusual forms of type, striking illustrations, inverted illustrations, and unusual patterns of type and words. These, as well as many other devices, have been found to be valuable. Not all, however, possess equal value. Moreover, the too frequent use of any one lessens its value. Loss of novelty means loss of pulling power. Furthermore, the use of such devices as colored background, unusual printing (large and small combined) and peculiar grouping of words and phrases, as in unbalanced sentences, may so increase the difficulty of reading as to detract from the value of the advertisement.

We do occasionally find an advertisement possessing considerable observational value because it is quite out of the ordinary. It may be unusual by way of the very nature and the arrangement of the various elements. Moreover, the wording may be novel and so command attention. Or, the illustration—picture employed—may be strikingly different. In all cases, in order to insure effectiveness the result must be made pleasing. Occasionally, an advertisement may produce the effect of novelty because of some disproportion among the members. It may border upon the grotesque. But here the advertisement tends to defeat its purpose, for the grotesque is seldom pleasing. Where it is embodied, the advertisement loses some of its effectiveness.

Repetition. This is undoubtedly one of the most important of the various conditions determining the attentive value of an advertisement. The more often a thing is brought before us, other things being equal, the more likely we are to observe it. This is especially true when the fundamental idea remains the same yet the vehicle changes. The clever presentation of the same idea clothed each time in a new manner undoubtedly serves to make a deep impression upon us. If repeatedly, upon opening magazines, we discover the advertisement of the same product staring us in the face, we tend to pick it out in other settings. We become definitely set for it. It is somewhat like the commonly recognized ability of an individual to pick out at once a familiar face among a group of strangers. Some concerns count very largely upon the repetitive value of an advertisement in producing business. The same idea is presented regularly daily, weekly, or monthly and, on the whole, with satisfactory returns.

Position. There are other factors than these which we have mentioned which serve to determine the attentive value of an advertisement. For instance, all pages of a magazine do not possess equal value in commanding the reader's notice. An advertisement on an inside page holds considerably less value than a like advertisement placed on the cover or outside page. This fact is clearly reflected in the difference between the charges for inside and outside positions in magazines. Thus an inside page in the *Atlantic Monthly* has carried a rate of $460 while the back cover has commanded a rate of $900.

The greater attentive value of one page over another is to be attributed to the fact that an advertisement in a preferred position is observed by a larger number of individuals. The most casual reader is quite likely to read what is placed on the outside cover page, or on the page facing the first page of reading matter, but he may not get very far into the magazine and so discover others. Moreover, an advertisement in a preferred position, particularly on the outer cover of a magazine, is not only seen more frequently, but it is, in general, the first or the last advertisement perceived by an individual when looking through a magazine. Here we have any advantage which may accrue to first and last impressions. Such impressions are usually said to contribute to the establishment of associations.

Various positions on the *same* page possess unlike values for attention. The upper half of a page, for instance, is approximately 10% more valuable than the lower half. Considered in terms of quarters, we learn that the upper left quarter is more commanding than any other quarter. The lower right quarter on the same page carries the lowest degree of attraction. These conclusions are based upon the studies made by Adams upon the relative values of the four quarters of a page. His tests consisted of a number of cards divided into sections each of which bore a letter. Each card was presented for a half second to a large number of individuals. Some of his results, in terms of the percentage of attention each quarter received and the percentage of times the letter in each of the four quarters was perceived *first* are shown in Table XXIII.

TABLE XXIII

Quarter	Per Cent of Attention Each Received	Per Cent of Times Each Letter Was Seen
Upper left	33 %	81 %
Lower left	21	13
Upper right	28	4
Lower right	17	2

The upper quarters, or the upper half, thus show greater attentive value than the lower quarters, or the lower half.

Characteristics of the Reader. We have considered certain qualitative and quantitative features of the advertisement, which, in general, determine its attentive value. When the producer has done all that he possibly can toward increasing the effectiveness of the advertisements of his goods by using colors, increasing the size, taking advantage of the principle of unusual intensity and contrast, selecting a particular position on the page, he realizes that other factors remain to be considered. The most important of these factors have to do with the desires, wants, needs, and habits of the reader, which tend to place him in the rôle of a prospective buyer.

The individual, we can say, who needs a suit of clothes is not interested in plows; the person who dislikes physical exercise is not touched by advertisements of sporting goods; the man of meager resources is interested in advertisements of goods of low price. There undoubtedly are, then, certain mental attitudes which partly determine the perceptive value of an advertisement. Or, if we wish to be more objective, we can put the matter differently and say that effective advertisements are those which have certain values placed upon them by the consumer which incline him favorably toward them. He may regard them in terms of one or more of such qualities as their style, their utility, their cheapness, their offer of wealth, their enhancement of beauty, health, and social position, their security, and so on. Each of such factors may operate to determine the effectiveness of an advertisement. Some persons, we know, are interested in goods if they are stylish; they do not care about price. Others are attracted by price; they do not care about style.

Under the head of subjective factors which influence demand for goods, Snow, for example, lists such factors as spending and earning power, habits of saving, standards of living, social position, habits of "following the style," liking for innovations, desire for sameness, desire for change, individual buying habits, family habits, sectional buying habits, community buying habits, class habits, racial and religious habits, emotional influences, change with education, sex differences, climatic conditions, and fads. To these a great many others might easily be added. Such factors are so diverse that it is possible in our limited space merely to mention them as a group. We cannot discuss them.

METHODS OF TESTING EFFECTIVENESS OF APPEALS

The business man who hopes to derive the fullest return from his advertising must know fairly well the particular nature of the appeal which he wishes to make before he "runs" his advertisement. Otherwise, he may proceed blindly. It is recognized, for instance, that two advertisements both apparently "good" may be run at identical costs, but the one may bring large returns while the other is a failure. It may be quite possible, we know, for a producer to reap large returns from certain forms of advertising without an actual knowledge of the particular feature that is effective. And, so long as he secures adequate returns, he may not bother. His objective has been attained. But if his advertisements fail to function after an expenditure of thousands of dollars, the average business man is bound to be curious about the reasons for such failure.

In order to increase efficiency and decrease waste—that is, in order to produce satisfactory results—the advertiser must employ reliable methods of determining the "pulling power" of his advertisements. He must determine the particular appeal or appeals to which he is to address his efforts; he must know which appeals are strong, and which are weak; he must know the size of advertisement best suited to the particular commodity which he is planning to market. In all cases, his methods of procedure are fairly limited. There are, in short, three outstanding ways of determining a solution to problems of the above nature.

Sampling. He may, for instance, develop his advertisement and run it in large, medium, or small sizes in one or more mediums. Or, he may, in case of direct advertising, send a catalogue, a booklet, or a sample to a small number of individuals. If the returns from these limited tests are satisfactory, he may properly assume that his return from more extensive advertising will be satisfactory.

Laboratory Tests. He may, however, submit a number of different advertisements to the laboratory for a comparative study. These may be shown in their various forms to several hundred individuals, who may rank them in terms of their effectiveness, or who may judge each in terms of its merits by comparing each in pairs with every other one. If the results of such tests tend significantly to favor one rather than another advertisement, the assumption is that what holds true for individuals in the laboratory will also hold true for persons outside the laboratory. Advertisements shown in this way to possess large memory value and "pulling" power may then be tested, if so desired,

by the sampling test outlined above for further indication of their value.

The objection which is sometimes raised against the laboratory method is that the individuals who take part in the tests cannot possibly approach the advertisements in a frame of mind like that of the prospective buyer. The attitude of the former, lacking in the urge to buy, is more "artificial," and more inert. The attitude of the latter, intent upon the problem of acquiring "goods," is more insistent and dynamic.

The Consumer. The third way is perhaps the surest. It consists in securing from many possible buyers of some general commodity a concrete expression of their likes and dislikes, their buying habits, their aims when buying, and so on. These expressions are obtained either through a personal interview or by mail. The individuals are asked very specific questions concerning a number of points which bear upon buying habits in the field covered by the article to be advertised. The data are then assembled; the various points are ranked in terms of number of times reported or in terms of their importance. With the results of such an investigation in his hands, the producer is unquestionably placed in a more strategic position to launch his attack.

The following data show the results of a study in which an attempt was made to determine, from a survey of 400 mothers who had charge of the buying of their boys' clothing, the comparative strength of the appeals of various advertised features of boys' clothing. The table shows the nature of *thirteen* forms of appeals and the median rank of each appeal as computed from the individual ranking made by 50 mothers in each of six districts. In the second column for each district are given the ranks of these medians.

Starch comments upon the results of this study in the following manner:

"Material" stands in first place in each of the six districts as the most important consideration in the minds of the mothers in buying boys' clothing. While there is little variation on this appeal among the different sections, district No. IV places even more emphasis on this factor, the rating here being 1.3, as against 1.5 or above for each of the other areas.

The strong appeal of price in all but district No. II should be noted. This section contains the middle and well-to-do population of the city. Style was given a high rank and very nearly the same rank in all sections, its lowest position being in rural district No. V, where it stood fifth, and its highest rank in district No. VI, where it stood second. The importance attached to style is further evidence in support of the earlier statement that even the rural and laboring sections attach considerable importance to style and buy good grades of merchandise.

TABLE XXIV

RELATIVE STRENGTH OF APPEALS FOR BOYS' CLOTHING

DISTRICTS	I		II		III		IV		V		VI		
Appeals	(Urban-Foreign)		(Urban-Best)		(Urban-Medium & Union)		(Sub-Urban)		(Rural-Medium)		(Rural)		Average
	Median	Rank	Median	Rank	Median	Rank	Median	Rank	Median	Rank	Median	Rank	
Material	1.6	1	1.5	1	1.6	1	1.3	1	1.6	1	1.6	1	1.5
Durability	3.8	4	2.7	2	2.5	2	6.7	7	2.1	2	4.3	5	3.7
Style	3.6	3	5.8	4	2.9	3	4.2	3	4.9	5	3.3	2	4.2
Fit	5.4	6	5.5	3	2.9	4	4.6	4	4.5	4	3.8	4	4.4
Price	2.6	2	6.9	8	2.9	4	3.7	2	4.2	3	3.3	2	3.9
Comfort	5.6	5	6.8	7	3.1	11	6.4	6	5.0	6	5.9	6	5.5
Tailoring	6.3	7	7.1	9	3.1	9	7.6	10	6.5	7	6.8	7	6.2
Merchant's Guarantee	8.3	9	6.4	6	3.0	7	6.8	8	7.4	12	7.0	9	6.5
Reputation of Firm	7.3	8	6.4	5	3.1	9	8.7	11	7.4	11	7.6	8	6.7
Satisfaction or Money-Back Guarantee	9.3	11	9.2	11	3.2	12	5.3	5	7.3	10	8.8	12	7.2
Maker's Guarantee	8.3	10	7.8	10	3.2	13	9.1	12	7.4	12	7.6	9	8.2
Wear Like Iron	11.0	13	9.7	12	2.9	6	6.8	9	7.1	8	7.8	11	7.5
Union Made	9.9	12	10.2	13	3.0	7	11.7	13	7.3	9	8.8	12	7.8

"Maker's Guarantee," which has to do with the idea of branded merchandise and the fact that the manufacturer stands back of the goods, is apparently a relatively low appeal with these mothers and does not seem to carry as much weight as one would anticipate. This is in accord with the preceding data on the question of brand familiarity and preference. There is still considerable opportunity for manufacturers to develop brand knowledge. "Union Made" ranked lowest in the various sections taken as a whole. It stood in thirteenth place in two districts—in No. II, a high class section, and in No. IV, the suburban college district. It stood near the bottom in all areas except in district No. III, union labor district, where it was ranked seventh. District No. III also attached the least importance to Maker's Brands, showing no preference in 98.5% of the cases. The appeal of Maker's Guarantee was given last place in this district.

In view of this attitude on the part of consumers, no emphasis should probably be placed on "Union Made" or "Maker's Guarantee" as selling points. In fact, there is hardly enough weight attached to them, except in one or two instances to warrant their use at all.

The ranking accorded Durability and Fit, averaging fifth and sixth places respectively, would justify the featuring of these appeals. The idea of fit had

been neglected in the advertising of this store. Since consumers attach importance to this factor, it should be emphasized. Moreover, "Comfort" receiving an average ranking of sixth, deserves attention. Apparently slogans such as "Satisfaction or Money Back," a Hart, Schaffner & Marx favorite, and "Wears Like Iron" do not have as much weight with consumers as is commonly supposed. It is also important to note that appeals having to do with the reputation of the firm, its size, its age, etc., are rated by consumers as weak. As between Merchant's Guarantee and Maker's Guarantee, it is to be noted that the former received an average ranking of eighth place, as compared with twelfth place for the latter (p. 209).

The types of appeals used in the copy should be in accordance with their relative strength in the minds of consumers, as shown by the tests. The appeals of Price, Maker's Guarantee, and Reputation of the Firm, which have been used frequently in the advertising of the boys' department, should be reduced and a corresponding increase in emphasis should be placed on Material, Durability, Style, and Fit. The other appeals should be employed according to their values (*18*, 209, 215).

RELEASING THE DESIRED RESPONSE

The whole process of advertising aims at establishing in the individual a desire for goods—a desire, however, which is expressed through buying. When the right sort of impression has been made upon an individual, the desired response of purchasing is released. We recognize that advertisements may be perceived and read. This does not imply, however, that they will become effective determiners of behavior. In order to produce the desired impression, that is to say, to induce a buying attitude, it is necessary to advertise in such a way as to cause the reader to feel the desirability of possessing some article or some material so strongly that he buys. Two outstanding means of releasing behavior, which we shall consider, are suggestion and argument.

One or both of these are found to be operative in every advertisement. In fact, an advertisement would not be effective without the presence of suggestion or reasoning. Some advertisements are more clever than others in the way in which they appeal to action through these means. They consequently possess greater stimulating power. Suggestion may act either directly as, for example, through command or invitation, or indirectly through reference to *analogous* cases. Again the presentation of a number of statements setting forth various reasons to show the wisdom of purchasing some commodity or article may lead directly to its purchase. The individual is set into action by being shown *why* he should buy a particular article. We wish to discuss briefly each of these two outstanding ways of determining buying action.

Suggestion. Suggestion is a means by which behavior may be directed, modified, and controlled without appealing necessarily to the "intellect", without causing an individual to consider long and carefully the advisability of acting in some manner. It is, in short, a way of initiating responses without resorting to reasoning or argumentation. In suggestion, a plan, or a hint, or a pointed remark is acted upon just as if an individual had thought long about some matter and had finally decided upon some course of action. Suggestion, moreover, furnishes a way of *inhibiting* undesirable behavior in an individual without his being aware necessarily of the actual operation of outside forces. Wherever we turn, we find suggestion effective in controlling human behavior through inhibiting some and releasing other forms of action. We know that a mother by kissing the "hurt place" may stop her child's crying, although she does not remove the bruised area. The ignorant person may elaborate, after her own fashion, upon a hint from the fortune teller and behave in a way which others would condemn as foolish. In this case, we have exemplified in a striking manner the ease with which the behavior of the individual may be controlled by another. Moreover, in gossip, a faint suggestion of suspicion may crystallize over night into firm belief in the guilt of some individual. Finally, the significance of suggestion is clearly to be seen in such diverse fields as Christian Science, faith-healing, hypnosis, and muscle reading. Without suggestion, the phenomenal characteristics of each of these could not occur. We have now to consider the rôle of suggestion in advertising.

The advertiser aims, as a rule, to lead the reader through suggestion to accept the truth of some idea and to believe in the value of some article without deliberately and openly expressing the nature of his aim. Pictures particularly lend themselves to the suggestive type of advertisement. While they are not necessarily of the suggestive form, they do operate, as a rule, to suggest or to heighten suggestion. The increased employment of illustrations in commercial advertising is one of the outstanding phases of the development of this field within the last few decades. In 1860, 6% of the advertising space in *Harper's Weekly* was occupied by illustrated advertisements. Twenty-five years later it had increased to 60%. About 1910 it was around 75%. Pictorial advertising is unquestionably on the increase.

Suggestion in advertising takes many forms. It frequently consists merely in giving the name, the picture of the article with or without the name or with some phrase such as "It floats," or "When better cars are made, *Buick* will build them." We find this method used in the advertisement of small and inexpensive articles, such as cigarettes,

as well as expensive articles such as automobiles. Not infrequently the major purpose of the advertisement is merely to keep the name before the reader. In fact, the repeated presentation of the picture of the object, or the trade name, is a fairly reliable method of making sure that the object will be thought about when buying time arrives.[1] We repeatedly see pictures of the Rock of Gibraltar with "Prudential" written across its face. The two are so inseparably tied up that we are not surprised to be told of the traveler who upon seeing the Rock for the first time looked for the legend. Some find it somewhat difficult to think of "Prudential" without having a feeling of stability and firmness —a feeling which accrues to the name partly, we believe, through association with the massive rock.

Suggestion may take the form of illustrations that give distinction. Packard cars and Fisher Bodies are frequently pictured in association with beautifully groomed individuals or with distinctive occasions. In a great many cases, the "atmosphere" distinctive of the individual or the occasion is apparently extended to the article. But this method of placing the human individual in the same picture with some article of trade may actually serve as a distraction. The desired effect may be lessened.

The story is told of a certain western gas engine manufacturer who ran an advertisement showing a very charming girl standing by the side of the machine which he was selling. To his chagrin, the advertiser actually received twice as many inquiries concerning the identity of the pretty girl as he did about the gas engine.

Suggestion works in still other ways. We know that we are duly impressed by size. We somehow feel that a product must be pretty good if a large amount of advertising space is used in presenting the article. Again, we find advertisements emphasizing the long years of service given by a company. The suggestion is that the company must be good in order to have survived over such an extended period of time. Other advertisements refer to the size of the plant—the number of acres it covers; the miles of railroad tracks in and around the place where the article is manufactured; the amount of floor space. Advertisements

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[1] Drever remarks that "the mere repetition of a name or statement tends to give suggestive value. Repetition may give suggestive value in two different ways. The more frequently a statement is made, the greater is our tendency to accept and believe it. On this principle the German news agencies persistently acted throughout the recent great war. On the other hand, an article, the name or maker's name of which is familiar to us, will in general be preferred to a similar article which may even be better suited to our purpose, but the name of which is unfamiliar' (*6*, 112).

also stress the number of people who use the article, implying in this way that it must be good to appeal to so many.

Under suggestion we may also list the wide employment of testimonials. An individual claims, through the use of some article, to have been cured, made happy or more charming. Many people assume that what is alleged to be true for one must be true for another. Not infrequently upon the strength of the endorsement of some well-known individual, people proceed directly to the purchase of some article. In the majority of such cases, people do not stop to reason about such matters. They do not realize that it is the easiest matter in the world to secure testimonial endorsement of any article. A great many people are apparently unable to resist the double appeal of financial return and publicity offered by the company that seeks testimonials. It would seem that some who are unable to get their names in the paper in any way write testimonials. Of the tendency of certain persons to sell the use of their names in advertising, we learn:

When Jess Willard whipped Jack Johnson the advertisements claimed that it was Nuxated Iron which did it; and when the same Willard was knocked out by Dempsey four years later the victory was again awarded to Nuxated Iron. In 1915 Willard wrote, "Without Nuxated Iron I am sure that I would never have been able to whip Jack Johnson so completely and easily as I did." In 1919 Dempsey wrote, "Nuxated Iron put added power behind my punch and helped to accomplish what I did at Toledo." Nor are the prominent names limited to the field of sports; for we read that "Former United States Senator Moran, pioneer in pure Food and Drug Legislation, Father of the Rural Free Delivery System, takes Nuxated Iron to obtain renewed Strength, Power and Endurance."

There is an organization known as "Famous Names, Inc.," with its main office in Chicago and branch offices in New York and Hollywood, that makes a business of selling to commercial concerns signed endorsements from movie stars, athletes, society people, and other "famous personalities." According to their circular advertising this service, "The fee for the exclusive use of a star is between $150 and $2500, depending upon the standing of the star and the length of time the exclusive use is desired. This fee includes the special posing and signed endorsements." The methods used are indicated in a form letter which was sent to a large New York advertising agency about the time of the recent visit of Her Highness Queen Marie. Mr. H. C. Klemfuss, the writer of the letter, stated that he would be glad to "consider arranging for endorsements of commodities or products of national reputation from Her Majesty, the Queen of Roumania." Such being the methods by which testimonies and endorsements are secured, it is readily apparent that we can put little confidence in the sincerity of such endorsements (*13*, 320, 321).

As a final form of suggestion we refer to a more direct type in which use is made, for instance, of the command, "Don't let this happen to you"; "Be prepared—even the best make mistakes"; "Write before it is too late." This direct form of suggestion, however, is often not as valuable as the indirect, for many individuals are antagonized by the frank urge to buy. They exhibit what has been called "sales resistance."

There are certain classes of articles in which advertisements of a suggestive nature work quite well. One student (*8*, 245) proposes the following list:

1. For all *personal* articles, the use of which is *intimate* and *private*, as toilet articles, gifts, stationery, and so forth;
2. For articles of *luxury*, *display*, and *adornment*, as jewelry, fancy dress goods, feathers and plumes, flowers, and so on;
3. For articles enjoyed *in themselves* or *for their own sake*, rather than for remote service which they may render, as drinks, musical instruments, sweetmeats, toys;
4. For articles calculated to promote the *bodily safety* of the individual or of those dependent on him, as disinfectants, safety devices, insurance, weapons of defence;
5. For *all food products*;
6. For all clothing which tends to be ornamental rather than utilitarian in character, as ties, collars, laces, canes.

Reasoning. In addition to the use of suggestion in creating the desired attitude and in releasing desired behavior, we must consider the part played by reasoning. In a large number of cases the advertiser strives to point out the particular advantages to be derived from the use of his merchandise. He cites reasons or facts. This method of producing the desired response is particularly effective in advertisements of certain types of products. It holds, for example, with machinery, tools, building materials—in short, where articles of a more impersonal nature are concerned. Positive reasons are more desirable than negative. A straightforward statement of facts based upon the findings of careful tests carries a great deal of weight with many persons when buying time arrives.

In the use of this form of advertisement, the reasons given must be as specific as possible. To deal in generalities in such matters tends to defeat the purpose of the whole procedure. Care, too, must be exercised not to give the impression of exaggeration. The reader must not be led to believe that this is just another case of misstatement by an overly enthusiastic advertising agent. Moreover, the reasons given should be strong, appealing points. Tires, for instance, must be more

resistant to puncture and to wear; pumps must be able to deliver so many gallons of water per minute or put so many pounds of pressure behind a stream of water; pipes must be leak-proof; or glass unbreakable.

As an illustration of this way of seeking to secure a favorable reaction to an article we note that the Walworth Company (*18*), in an advertisement, pictures a locomotive and then relates their products to it in the following manner: The American Locomotive "hauled 17,000 tons—by far the heaviest load ever pulled by one locomotive—over a long grade in the Blue Ridge. It operates with superheated steam at 215-lb. pressure, and a temperature of 650 degrees F. Its 200 Walworth Kewanee Unions make leak-proof steam and air connection." The advertisement then proceeds to enumerate the advantages of such unions as:

(1) Brass to steel ball seat—no gasket
(2) Brass to iron thread connection—no corrosion
(3) Compressed-air test under water—no defective unions

It ends with a statement that "we are sending ¾-inch Kewanee Unions for 24 cents to engineers—as the quickest way to make a demonstration."

TRADE MARKS, NAMES, SLOGANS

There remains one matter to discuss in connection with the major problem of releasing the desired response of buying through advertising. It has to do with trade marks, trade names, and trade slogans. This matter might well have been considered under the general heading of suggestion since trade marks, trade names, or trade slogans function very effectively as suggestions to behavior. They subtly suggest or voice the desirability of the article. Such descriptive and suggestive phrases as "Good to the last drop," "Best in the long run," "Eventually, why not now," "Ham what *am*" flung repeatedly at us through one medium, or hammered repeatedly into us through another medium of advertising are eventually bound to produce desirable effects.

For actual proof of the great value of trade marks, etc., we need but consider their estimated worth to the manufacturer. Starch has summarized quite well in a few paragraphs some figures bearing upon this problem. We quote from him:

President Green of the National Biscuit Company stated in a public address some 10 years ago that he estimated the trade-mark "Uneeda"—which has been flattered by more than 400 imitations and infringements—as worth to his company more than $1,000,000 a letter, or in excess of $6,000,000 in all. The Gorham Manufacturing Company declared, in a legal suit for the in-

fringement of their Lion and Anchor trade-mark, that this mark was worth between $1,000,000 and $2,000,000. An officer of the Coca-Cola Company placed a valuation of $5,000,000 upon the trade-mark of his firm. In the recent plan to dissolve the American Tobacco Company, the trade-marks were valued at over $45,000,000 out of total assets of $227,000,000. The trade-mark "In-er-seal" used by the National Biscuit Company was said to be valued at $1,000,000. The trade-mark "Royal" for baking powder was valued at $8,000,000.

According to a statement made in 1907, the trade-mark of Mennen's Talcum Powder was estimated at that time to be worth several times as much as the whole business was a decade previously. Today the trade-mark is valued at over $10,000,000. The trade-mark of Walter Baker & Co. has been rated at $1,000,000.

"Characters," while not the same as trade-names, owe their value to the same psychological causes and serve very much the same purpose. Mr. N. K. Fairbanks asserted that $10,000,000 could not buy the Gold Dust Twins and the Fairy Soap Girl. The mark of Onyx hosiery has recently been rated at $1,500,000 by an officer of the firm.

Other well-known trade-marks have been assigned the values as follows: The Quaker Oats trade-mark was valued at $9,000,000. The name Kodak has been valued at many millions. The United Cigar Stores on December 31, 1916, appraised in their annual report trade-mark, trade-names, good-will, brands, etc., at $21,400,000 out of total assets of $44,306,957. It has also been stated that the DeLong Hook & Eye Company have been offered $1,000,000 for the name DeLong, but that they would not take many times that amount. According to an officer of the California Fruit Growers Association, the trade-mark "Sunkist" is valued at at least $2,000,000. The Tobacco Products Corporation, in buying the business of the Schinasi Brothers' "Natural" brand, paid $2,000,000 for the trade-name and good-will alone. This amount was equal to about four years' profits of the business. It also took over the Melachrino brand on the basis of earnings of $300,000 on the name.

Mr. Duke testified on the witness stand that he valued the name "Bull Durham" at between $10,000,000 and $20,000,000. It has been rumored that the R. J. Reynolds Tobacco Co. was offered $10,000,000 for the good-will and name of the Camel cigarette (*18*, 675).

The operation of a trade mark or trade name to release buying behavior represents most clearly the linking up of wants with particular brands of commodities. An individual finds satisfaction through the use of some particular article or class of articles (*e.g.*, "57 Varieties") and tends thereafter to purchase these goods. Here is the buying "habit" in its clearest moments. The purchaser favors a particular kind of goods because he identifies it with the previous satisfaction of needs and wants. Moreover, he feels that he is not taking any risk.

He has always found this brand to be good; he assumes that it will be so in the present case. Furthermore, he is relieved of the bother of changing. Most persons suffer from this sort of inertia. People are reluctant to change. Even after they cease to be wholly satisfied with some article, they may continue to use it. They have acted in a certain way for such a long time that they experience difficulty in establishing new patterns and new responses involving the use of new articles.

Since the tying-up of trade names with wants is the primary function of advertising, effective advertising is greatly handicapped where trade marks and names are lacking, for there is nothing *specific* to which needs and wants may be linked. Where a trade name exists the repeated presentation tends to establish it so firmly in connection with some commodity and the satisfaction of wants that the appearance of the want brings the trade name to the tip of the buyer's tongue.

Several studies have been made upon the nature and strength of associations between trade names and commodities. Hotchkiss and Franken, for instance, sought to determine the first name associated by more than 1,000 college students with 100 different commodities. To the stimulus "baked beans," 499 responded with Heinz and 8 with Libby. Approximately 50% gave the former. Such a striking percentage is to be largely attributed, we believe, to the influence of extensive advertising and not to any essential difference in quality between these two brands of baked beans.

The evidence secured for the other products clearly shows that certain lines of commodities dominate the minds of individuals. The assumption in each case is that they owe their commanding positions largely to extensive and persistent advertising. Table XXV shows the per cent of first responses of individuals to the names of various kinds of commodities.

As a final problem in the field of advertising, we wish to consider the matter of the confusion of trade names. This problem is economically important, for it is concerned with the general topic of trade name infringement. Repeatedly, producers are forced to defend the trade names of their commodities against imitation and infringement by other concerns which deliberately seek to take advantage of the attitude created toward a given class of goods by an older company. The trade names of The National Biscuit Company alone have been imitated hundreds of times. Psychologically regarded, the problem of infringement resolves itself into a study of the tendency of individuals to confuse one name with another. A few years ago Paynter reported the results of an extensive study upon this matter. His procedure consisted

TABLE XXV

PER CENT OF FIRST RESPONSES

Commodity		First Response	
Stimulus Word	Response	Male	Female
Cameras	Eastman	92	84
Sewing Machines	Singer	82	72
Soups	Campbell	72	80
Collars	Arrow	84	66
Fountain Pens	Waterman	82	66
Coffee Substitutes	Postum	72	78
Cleansers	Old Dutch	68	80
Chewing Gums	Wrigley	76	58
Crackers	National Biscuit Co.	74	60
Grape Juices	Welch	68	56

in the presentation of pairs of names to a number of individuals. One member of the pair was an actual trade name; the other was an imitation. He included among his lists several original trade names together with their alleged imitations upon which the court had rendered decisions as to infringement. He determined the number of times each was confused with the other. Table XXVI shows 9 such pairs of names. Of these, 5 had previously been held by court decision to constitute infringements. The remaining 4 were not considered, however, to be infringements. In some cases (see *a* and *b*) the percentage of confusion was equal, although in these cases the court held two to be, and two not to be infringements. In some cases held by courts as not constituting an infringement, the per cent of confusion between names was actually greater than in some other cases in which claims of infringement were upheld.

TABLE XXVI

COURT DECISION ON TRADE NAME INFRINGEMENTS

Decision		Trade Names		Percentage of Confusion
		Original	Imitation	
Non-infringement		Sozodont	Kalodont	28
Infringement	*a*	Nox-all	Non-X-Ell	28
Non-infringement		Bestyette	Veribest	35
Infringement	*b*	Club	Chancellor Club	35
Non-infringement		Peptenzyme	Pinozyme	43
Infringement	*c*	Au-to-do	Autola	40
Non-infringement		Mother's	Grand-Ma's	38
Infringement		Green River	Green Ribbon	50
Infringement	*d*	Ceresota	Cressota	63

On the whole, Paynter's results show that some of the imitations declared to be legal by the courts actually confused more individuals in the recognition experiment than did some of the imitations declared illegal, and *vice versa*. It would appear from this, that some of the court decisions upon infringement and non-infringement were apparently inaccurate and inconsistent.

SALESMANSHIP

The problems of salesmanship are both like and unlike those of advertising. They are alike in that the primary purpose of each is to attract the prospective buyer and to release the desired response of buying. In each, effort is made to direct the attention of the individual toward some article or articles and through suggestion or reasoning produce action. They are different in that the latter introduces the personal human element, for in salesmanship the personality of the salesman is directly brought to bear upon the buyer. It is recognized in this connection that individuals are more suggestible in the matter of buying when in the presence of the salesman. Under such conditions many of us, for instance, buy articles which we would like to return when we are away from the influence of the salesman.

The problems of salesmanship are more difficult to study accurately than those of advertising. Buying and selling in the store where the buyer is in close contact with the seller create relations which are peculiarly elusive. It is almost impossible to subject these relations to experimental investigation. The methods of approach used by the salesman, the employment of the tactful phrases to effect the breakdown of "buyer" inhibitions, the subtle influence exercised by the salesmen through manner of voice, dress, carriage, or the clever turn of reasoning which results in a sale scarcely lend themselves to precise investigation. In advertising, however, the elements are less elusive. Advertisements may be studied—analyzed and compared—in the laboratory. The nature of one appeal may be compared with another; individuals may be canvassed as to their wants and the way they satisfy them; or surveys may be made of the demand for a particular kind of commodity. Salesmen, it is true, may be studied, but any undue intrusion upon their relations with the customer are bound to interfere seriously with their proper functions.

On the whole, the relations between advertisements and the reader are more static; the relations between the salesman and the customer, on the contrary, are more dynamic in character. The advertisement is more concerned with groups or masses; the salesman is almost always

concerned with an individual. If this *individual, personal* touch were not actually so much in demand, the general employment of automatic selling machines would, no doubt, find greater sanction in the market place. We wish now to turn for a moment to view the problems of salesmanship. In our brief discussion of this general topic, we shall glance first at the customer and then at the salesman.

The Customer. Drever lists certain large kinds of buyers. There is one group composed of individuals who mean to buy and who know what they want. There is another large group of individuals who mean to buy but who are not wholly sure of the nature of what they want. "A customer in this condition is often hard to please," we are told, "but may be a good buyer if the salesperson can help him to define his need." Finally, there is a third group of individuals who are willing to buy but who have only the vaguest notion "even of the kind of thing on which" they ought to spend their money. Obviously, the salesman has little to do with persons of the first group. They know what they want. They are in reality sold before they enter the store. Such individuals take the first thing that is offered to them if it is the kind of article for which they have come. They are also the most difficult individuals to turn to something else; they show great "sales resistance." The salesman, in such cases, functions largely by merely delivering into the customer's hands the thing the latter wants. Very little selling art is required. But with the individuals of the second and third groups the salesman finds an opportunity to function. Here the personal element of selling enters. The salesman may now exercise his art.

The Salesman. The primary task of the true salesman—not some automatic helper—is to size up the customer. He must strive to determine something of the traits of the buyer. Snow says:

> It is the duty of the salesperson to acquaint himself with *individual* characteristics of the prospective customer, in order to adapt his appeal so that it will be most effective. In fact, it is dangerous for the salesperson to get into the habit of classifying customers too much according to type. If the clerk immediately thinks, "That man is a grouch" and treats him as a typical chronic grouch, he may be entirely wrong. Under another set of conditions the man might not be grouchy at all. Perhaps the man's stomach is upset that morning, or he has suffered several disappointments. If the clerk is cheerful, and succeeds in interesting the man in a particular article, the grouch may entirely disappear—at least for the time being. *If the clerk notes the individual characteristics of customers, instead of classifying them according to types and treating them as such, he will be more certain of success* (17, 344).

It is unquestionably true that some individuals are more successful

as salesmen than are others. Since we cannot accept the claims of those who think in terms of "born" salesmen, we are forced to believe that the more successful individuals owe no small part of their achievement to the use they make of the knowledge which they have acquired of human nature. Of the traits which we assume to be the most important in a salesman, a primary one is the ability to understand the customer. Other things being equal, the most efficient salesman is one who can size up a customer, who is able to judge roughly from the customer's answers and his actions in the salesman's department the nature of the customer's wants—the direction in which his primary interests lie. He is able to determine "what, if any, characteristics or tendencies in him may be appealed to, how he reacts to suggestion, direct and indirect, and so on." Drever points out that "the time spent in getting this knowledge—and with skillful salesman and an ordinary customer it is usually very short—is really time gained." With such knowledge the salesman can then direct an individual's attention in such a way that he is turned into a buyer or as Drever would say, the salesman can "change type C (third group or buyer) first into B, then into A, and finally evoke the necessary reaction" (p. 122).

The psychological characteristics of the successful salesman have been pointed out repeatedly in publications dealing with the problems of selling. A cardinal virtue is *patience.* The annoyed or impatient salesman cannot make proper use of his head in analyzing the customer. Moreover, he tends definitely to build up sales resistance on the part of the buyer. A temper that cannot be ruffled is unquestionably a valuable asset in furthering the success of a salesman. Another effective trait in a salesman is *enthusiasm.* It is undoubtedly true that the person who is sincerely interested in and enthusiastic about his work and the materials which he sells is quite likely to impart a share of these characteristics to the customer and thus definitely incline him toward a purchase. Some believe that great salesmen apparently come, through a process of autosuggestion, to believe the many things which they tell their customers about that which they sell. They are so "sold" on a particular article that they are able to arouse a like feeling in others. Next to sincere enthusiasm born of a firm confidence in the value or worth of some commodity, we rank a broad knowledge of the commodity or material which an individual sells. The customer soon grows bored and indifferent if the salesman seemingly knows little about the article. Moreover, such a lack of information does not heighten confidence in the mind of the average buyer. But these traits are not sufficient. The salesman who wishes to be successful must be neat in

appearance, tactful and courteous in address, cheerful in demeanor, and possessed of quick ability to learn names and to recognize faces.

The selection of salesmen should be made in terms of such traits as the above. So far very little progress has been made in the employment of objective, or trade tests to determine the suitability of individuals for sales positions. Most concerns hire upon the basis of general appearance—posture and dress—and previous training, either academic or technical. Individuals are given a trial, and, if they prove to be undesirable, are released. The scientific selection of salesmen waits upon the development of a proper method or means of measuring such traits as the ability to understand the wants of others, to meet others in an affable and courteous manner, to learn names and faces of customers so as to be able to address them by name, or to recall previous sales to an individual and so bear better in mind the nature of the individual's tastes and desires. A fairly objective system of rating salesmen is also desirable. The rating may be done by other salesmen, by a supervisor, or by some individual skilled in good salesmanship who comes as a customer to the salesman without the knowledge of the latter. The individual can be rated in dress, speech, bearing, knowledge of stock, courtesy, and sales talk.

Efficiency is much sought after in modern commerce. There is as yet great waste—both in producing and in selling. Some of the problems in this large field do not lend themselves readily to strict investigation. Others are more easily attacked. On the whole, where the application of strict methods of study has been possible, satisfactory results have followed. Psychologists in particular, viewing the outcome of the many serious attempts in recent years to derive a sensible understanding of the complex processes involved on every hand in the field of commerce, have been encouraged to press on. They believe that patient and persistent seeking will, in time, add much to our knowledge of effective methods of production and selling.

BIBLIOGRAPHY

1. Adams, H., *Advertising and Its Mental Laws.* 1916.
2. Blanchard, F., *The Essentials of Advertising.* 1921.
3. Brisco, N., *Fundamentals of Salesmanship.* 1916.
3. Calkins, A., *Business of Advertising.* 1925.
4. Clark, E., "Trade-Name Infringement," *Am. J. of Psych.*, 1923, *34*, 602.
5. Donovan, H., *Advertising Response.* 1924.
6. Drever, J., *The Psychology of Industry.* 1921.
7. Durstine, R., *This Advertising Business.* 1928.
8. Hollingworth, H., *Advertising and Selling.* 1920.

9. Hotchkiss, G., and Franken, R., *The Leadership of Advertised Brands.* 1913.
10. Ivey, P., *Elements of Retail Salesmanship.* 1923.
11. Kitson, H., "Minor Studies in the Psychology of Advertising," *J. of App. Psych.* 1922, *66*, 59.
12. Kneeland, N., *Cases in Retail Salesmanship.* 1924.
13. Moss, F., *Applications of Psychology.* 1929.
14. Paynter, R., "A Psychological Study of Trade Mark Infringements," *Arch. of Psychology*, 1920, *26*, 1.
14. Ramsay, R., *Effective Direct Advertising.* 1923.
15. Schumann, R., *Advertising and Selling.* 1911.
16. Scott, W., *Psychology of Advertising.* 1908.
17. Snow, A., *Psychology in Business Relations.* 1925.
18. Starch, D., *Principles of Advertising.* 1923.
19. Strong, E., *The Psychology of Selling and Advertising.* 1925.

CHAPTER XIII

PSYCHOLOGY AND LAW

Introduction

The primary function of the law is to control human behavior. As such it has its psychological side. Concerning the relation between psychology and law, one lawyer writes as follows:

> It is becoming increasingly evident that behavior can be interpreted through psychological methods. As the law deals with behavior in all its diversified forms, the use of such methods and data is becoming daily more necessary in the modern development of legal practice and procedure. Psychology and modern science are pointing the way to the new highway that leads away from the old formalism of the common law and into the new fields of justice according to human nature and the social rights of men in everyday life. . . . In the field of the law, whether in the court room, in the office, or in connection with those myriad transactions of human life with which the law must deal, psychology has an important place. It is impossible to evaluate human behavior or understand its various ramifications, in either its individual or its social manifestations, without using a measure of psychological data. We must understand the mental operations of the individual and his behavior mechanism, as well as the social contacts with other individuals, and the influences of environment upon such behavior, before we can appreciate at their true worth the springs of human action. Human nature and the law are so closely associated that, like the Siamese twins, separation would be fatal to both (*12*, 13, 25).

As we pointed out in our discussion of social agencies, law represents an outstanding way of determining conduct. It furnishes a very strong appeal to certain types of human motives and desires. It capitalizes upon man's fear of punishment, upon his desire to retain his freedom, and upon his desire to live. In the light of these desires an individual may establish strong behavior patterns. Ordinarily, these sustain him in many crises of life. At times, however, he reaches his limit—these behavior patterns break down. Great emotional seizures, for instance, exact their penalty—momentarily the individual figuratively loses his head, and he may pay for it with an actual loss of the same. Some individuals, we know, are much better fortified than others against the onslaughts of chance crises. They have had better social training; they possess a more balanced set of values; they have a more firmly

established economic position; and they have a better innate equipment in the form of a greater fund of intelligence and a greater degree of emotional control. Those who are not so fortunate in these respects frequently appear at odds with the law. They belong, we say, to the class of delinquents or criminals.

Laws are the products of psychological organisms. They are the brain children of mental action. In this connection, Brown writes:

> Before a law can be made it must first be conceived in some mind. Further, it must not only be realized by all the minds necessary to make it a law, but it must possess enough influence to persuade the minds to pass it. . . . Laws are directed to minds as well as being created by them. The maxim "ignorance of the law excuses no one" shows this to be the case. Laws are directed to minds and it is the duty of those minds to learn the laws. Ignorance, a mental condition, cannot be pleaded as a means of escape. Minds being the organ by which new ideas are realized and by which reason is effected, it is only logical that laws should appeal to the minds of those whom the law affects. In the interpreting of the law and the settling of disputes which arise thereunder minds are again involved. Our courts are the means by which this is done. The judges are men with trained minds, who have been elected or appointed for the purpose of using their minds in the adjudication of legal problems which are presented to them (p, 8).

We recognize that the psychological problems of law are manifold. Wherever the nature of man and the play of his environment tend to bring him into conflict with the law we have a psychological problem in terms of the causes of such misconduct. These are the psychological conditions of crime. Moreover, there are the tasks of determining the nature of his guilt and his "degree of responsibility." Here are the problems of the emotionality, the understanding, and the inhibitory powers of the individual. Furthermore, there are the problems of the nature of the treatment to be accorded the criminal and the psychological effects of such treatment (punishment) upon him. Finally, a major problem of law procedure that shows striking psychological aspects is concerned with the witness and the accused and their testimony. Here come the problems of determining the truth of statements, and of tapping the hidden thoughts of the individual. Some of these psychological problems of law must be considered closely—they are quite important. Our first task calls for a treatment of some outstanding contributory conditions, or causes, of delinquency. We shall then review in turn the problems of the collection and evaluation of the evidence concerning the guilt of the criminal, his responsibility, and his treatment.

THE NATURE AND CONDITIONS OF CRIMINALITY

The Meaning of Crime and Criminals. Before we proceed further we must say a word concerning the nature of crime. We use the word to include delinquency, misdemeanor, and felony. In this sense, crime is considered as an *unlawful* act, an offense against the public, which renders the perpetrator of the act liable to legal action. A crime is an act which is contrary to the laws of society, and which is considered by society as deserving of punishment.

We assume here that criminality is not innate. No one is determined through heredity to be criminalistic. Crime is the violation of law. It can scarcely be maintained that individuals are innately equipped in such a way as to make it impossible for them to prevent violating the law. Individuals are neutrally equipped in this respect at birth. But society makes or breaks them during the course of their lives. "Criminals," Münsterberg writes, "are not born, but made—not even self-made but fellow made" (p. 260). And Buckle, in his *History of Civilization* remarks that the "offenses of men are the result not so much of the vices of the individual as of the state of society into which the individual is thrown" (*17*, 29). Heredity, to a certain degree, provides the individual with traits and tendencies. Heredity, we say, determines the limits of his intelligence. It decides the nature of his emotional equipment, and it limits his resistance to suggestibility. It seems true that the possession or the lack of certain innate traits contributes toward criminality. Each of such traits as feeble-mindedness, insanity, heightened suggestibility, and emotional instability may play a significant part in determining behavior with respect to law and society. Such conditions are mainly intra-organic in character. Other contributory conditions which are largely extra-organic are weather and climate, social and economic conditions, and drugs. In addition to the above there are other causes or conditions each of which may serve as the immediate agent releasing criminal behavior. Here enter a myriad of possible desires and motives any one of which, if expressed too strongly, or if satisfied in ways unapproved by society, may lead to criminal behavior. We shall examine each of these two large groups, the contributory and the immediate causes of criminality, under the heads of the intra-organic and the extra-organic conditions of criminality.

INTRA-ORGANIC CONDITIONS OF CRIMINALITY

Feeble-Mindedness. One of the innate contributory conditions of delinquency is feeble-mindedness. Individuals of deficient mentality tend to break down more easily under complex conditions of society.

They are not able to sustain themselves to the same degree as are those individuals who possess a higher degree of intelligence. The classes of feeble-minded individuals exhibit varying degrees of ability to order their lives in accordance with social demand. The lower degrees of mentality do not constitute major problems in this respect. Idiots and imbeciles are usually institutional cases. But they may be found in the population at large, where they occasionally commit serious crimes. The moron, however, may get around at times without being suspected. Under conflict or unusual provocation he may break down and commit some criminal act. The crimes are generally of a very minor or a very major sort; that is, there are few "middle" crimes. They are so often either cases of petty thieving or vagrancy, or serious offenses of a sexual or a homocidal nature. The feeble-minded do not usually forge the names of others; they do not make clever counterfeiters, nor they do not impersonate others and secure money under false pretenses. They do, however, commit minor crimes against property and major crimes against persons.

The feeble-minded become criminals, we say, because they lack sufficient understanding and foresight to realize the nature of their acts. They are wanting, we say, in good judgment. They cannot establish and maintain firm patterns of social behavior. They may be able to say that an act is wrong without any abiding appreciation of the wrongness. They have the outward semblance of conformity without a true knowledge of what things mean.

Recently, in New York City, a young man was brought before the criminal courts, charged with having pushed a *femme publique* off the end of a dock to her death. The woman had resisted and he had casually thrown her into the inky river at midnight. On examination he was quite incapable of connecting the innocent "shove" he had given her and the consequences of death. Indeed, he was able to think of death only in a feeble abstract way, like a very young child (*23*, 154).

They are also inclined to delinquency because they lack sufficient control over their emotions to restrain them when strongly thwarted. The upper grades of the feeble-minded are equipped with the usual emotions of the average individual, but are commonly wanting in their ability to order their conduct in a normal manner. When a crisis arises, their behavior is determined more by their feelings and less by their heads. We might say that so long as defective intelligence is alone involved, little danger to society exists. But where the former is combined with a serious disturbance of the emotions, the matter assumes

a different aspect. Either is unquestionably bad, but a combination of both is indeed a calamity. Schlapp and Smith remark that many individuals are not only lacking in "essential parts of the brain but they are also chemically unbalanced, so that their emotions sweep them off their feet at slight provocation. Such types are, of course, always dangerous, always prone to deeds of violence for which sufficient motive can only be found by the specialist" (p. 155).

As a striking illustration of a crime committed by a feeble-minded individual—one who was apparently lacking in good judgment, in understanding of the consequences of a revolting act, and in emotional control—we cite the case of Louis Fortin. This man, a farm hand, in a sudden fit of anger slew his employer, proceeded to the home, killed the employer's wife and baby, and burned the house. Subsequently, he went to town, drew out several hundred dollars from his employer's account, had supper, played pool, and went back to the farm. The next day he went to work in the field as usual and was taken from there to jail. An examination showed him to be a moron. His mother and sisters were also feeble-minded. Of him Hoag and Williams write:

> Fortin could not make change, knew nothing of the simplest geography, not even knowing of his own region; read only simple words, and had no interest in anything outside of his immediate environment. Sexually, he was notoriously bad. At the examination it was clear to us that this man was not only feeble-minded but epileptic as well. In regard to the crime, he was totally indifferent and remained so throughout the entire trial, showing more interest in the dinner hour than in anything else. The jury claimed that a man who could earn fifty dollars a month and pass muster as a fair farm hand could not be feeble-minded and must therefore be responsible for his moral action.
>
> No claim of insanity was made, and as feeble-mindedness is, in California, no excuse for crime, Fortin was duly convicted and hanged. Society lost nothing in his death, but society committed a grievous error in failing to recognize in him the potential criminal requiring only a right set of circumstances to turn him from a stupid, harmless ranch hand to a monstrous criminal. In the death of Fortin an irresponsible degenerate has been removed from the world, but meanwhile little effort is being made to prevent similar degenerates from propagating their kind and continuing the perpetration of similar crimes. The list of such crimes continues and will continue unabated until such time as our courts and the people at large recognize the menace of the feeble-minded in our communities (*8*, 68).

The feeble-minded are inclined to criminal careers because, as a class, they are quite suggestible. This trait coupled with urgent desires and

an inability to earn sufficient money to satisfy such desires makes them easy prey to those persons who appeal to their urges. Thus they are easily led into undesirable paths—into crime and sexual delinquencies. Because they are suggestible and lacking in inhibitions, they fall ready victims, for instance, to vendors of narcotics and alcohol. It has been repeatedly pointed out that feeble-mindedness and the use of drugs and alcohol are frequently associated.

Concerning the relations between mental deficiency and crime Healy writes:

> Without any idea of being merely cynical, I insist that penitentiary sentences are being served for the most part by those not endowed with shrewdness enough "to get away with" crime, not well enough off to have good legal defense, not energetic enough to move off to another state after they have committed a crime, and that, above all, they probably represent an undue proportion of mental defectives, as compared to criminals in general. . . . Among caught delinquents and criminals, there is, undoubtedly, a much greater proportion of mental defect than among the ordinary population. Suppose we say that 1 to 3 per cent of the population would rate as defective according to the standard age-level tests now in vogue; then we find by the same criteria from 10 to 15 per cent of delinquents defective as they appear in the juvenile court. . . . The essence of the figures now available from many sources is that while mental defect in an undue proportion is found among inmates of prisons and correctional institutions of the several types, nevertheless we cannot conclude that feeble-mindedness is at all the large factor in the causation of criminality that at one time was supposed (7, 394).

Insanity. Another contributory psychological condition of crime is insanity. This is a general class term to include such forms as paranoia, dementia praecox, manic-depressive disturbances, and paresis. It is recognized that under severe mental diseases, individuals may commit very serious crimes against others. In paranoia an individual may labor under the delusion of persecution. If he should happen to attribute his persecution to some individual, he may seek to "escape from this enemy," but since this is usually impossible, he may in desperation commit murder. In dementia praecox there may be a loss of emotional life. The individual is unable to feel pity or sympathy for others. If an individual stands in the way of satisfaction of desires, he may be ruthlessly slaughtered without any apparent hatred of the person or any fear of the consequences. A Chicago man returned to his home after serving as an officer during the World War. He became attracted by a girl, and, because his wife stood in his way she was brutally murdered. An attorney, a few years ago, chopped off his wife's head, burned

her body in a furnace, and cemented her head in a block of concrete. Both murderers supposedly suffered from dementia praecox.

EXTRA-ORGANIC CONDITIONS

Weather and Poverty. We have earlier referred to the effects of weather, climate and season upon certain types of crimes. In winter, crimes appear to be more against property; in summer, they are more against persons. Poverty, too, contributes to crime. Aside from the thwarting of desire and the exaggeration of conflicts, it means, generally, a weakening of the influence of the home which might otherwise be wholesome. Where both parents work, children are too often lacking in proper guidance. They play upon the street where they may come into contact with the very dregs of humanity. Moreover, where poverty is great, children are often placed in factories and work-shops where undesirable influences frequently operate upon their impressionable minds.

It is the chief argument of the "economic school" of social students that criminality is the direct result of poverty. D'Holbrach sums up the whole plea: "If wealth is the mother of vices, poverty is the mother of crimes." Others reduce the economic theory of criminal causation to poverty, the display of the rich, and the unequal distribution of wealth. But it is extremely difficult to perceive any significant and immediate relation between poverty on the one hand and such crimes as murder, bigamy, and rape on the other. In some crimes, poverty unquestionably stands as a major form of determination. But in many others, non-economical causes must surely enter.

School, Church, State. We have also referred to the results of the failure of those social agencies which are supposed to look after the growing adolescent. There is no doubt but that a great deal of crime is to be attributed to the improper functioning of those agencies whose task is to guide the young. McCarty cites the case of a bobbed-haired bandit. She was born under wretched environmental conditions, deserted in a rooming house as a young girl by a mother who even stole her clothing from her. She was thrown entirely upon her own resources. Before she was twenty-one, she had committed several robberies and had been condemned to prison.

> No record could be clearer or more eloquent. None could leave less room for doubt that Cecilia Cooney is a product of this city, of its neglect and its carelessness, of its indifference and its undercurrents of misery. We recommend her story to the pulpits of New York, to the schoolmen of New York, to the lawmakers of New York, to the social workers of New York, to those who are tempted to boast of its wealth, its magnificence and its power (*12*, 519).

Drugs and Alcohol. A major condition of crime is the use of drugs and alcohol.[1] These factors may contribute to crime in several ways. We know that their use may serve to reënforce some determinations and weaken others.

The individual may become utterly indifferent to the possible consequences of his conduct. Drugs and alcohol tend to rob the individual of his ability to look ahead and to weigh the consequences of his act. Moreover, they arouse the passions and strengthen desires so that an individual may be driven to commit some act from which he would shrink were the excitants lacking. Even the most casual observer must have seen the cruelties practised by individuals while under the influence of alcohol. Such toxins often bring new traits of individual to the surface. Under intoxication some persons become utterly devoid of sympathy, love, kindness. Under undue provocation, they actually become a menace to the lives of others. The most dangerous condition under alcohol appears in delirium tremens. The individual may murderously attack the members of his family or any person who chances to be near him. Here we see most clearly the abnormal effects of alcohol. In fact, alcoholism and insanity are quite similar in several respects. Mercier long maintained that intoxication is in reality a form of insanity. Because the condition is quite temporary, and because the "cause" is so "obvious," most individuals have refused, however, to recognize the truth of his claim. Of this point Arnold writes, "In essential nature the two are identical, and if, after a prolonged course of drink extending over a year a man becomes habitually uproarious and habitually prone to commit unprovoked assaults, he is looked upon not as being drunk but as insane" (*2*, 511).

METHODS OF DETERMINING GUILT

A major problem of legal procedure with the criminal has to do with determining his guilt or innocence. To this task are bent the efforts of psychologists, judges, juries, lawyers, and police officials. The methods employed depend somewhat upon the nature of the crime with which an individual is accused and upon the attitude and training

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[1] Schlapp and Smith sum up results of 15 years of contact with criminals of the worst sort in the courts and clinics in New York City: "The studies have shown that all murderers fall into one of four groups: First, those afflicted with obvious insanity—dementia, paranoia, mania, etc.; second, those suffering from mental deficiency, the more or less gravely feeble-minded of all ranks; third, the epileptics; fourth, the emotional defectives, including the group disordered by extrinsic poisons, drugs, etc." (*23*, 234).

of the individuals intrusted with the task of dealing with the accused. There are certain methods which are employed outside the court room, and there are other methods which are used inside the court room. We shall discuss the former; then turn to the latter.

Third Degree. Of the former type, we find, as the oldest, the method of the third degree. This is the procedure not infrequently employed by police officers, prosecutors, and others to determine the guilt of some suspected individual. It seeks mainly to secure a confession of criminal behavior through use of physical force, intimidation, emotional shock, suggestion, or a breakdown of inhibition under great fatigue. The individual may be frightened either through threats or rough handling into admitting his guilt. He may be taken to the scene of his alleged crime, or he may be shown objects related to some crime in the expectation that they will serve to break his resistance. He may be kept awake for a considerable period of time during which he is questioned repeatedly about his connection with some crime. Under great fatigue he may become highly suggestible and, during this condition, give damaging evidence against himself. Again he may actually admit criminal behavior in order to secure rest or to escape from his examiners.

While such methods may be effective at times, they very frequently possess little value, for the results obtained in this manner cannot be used in a great many cases. The court refuses to recognize them. As an illustration of the attitude of the latter toward such methods we quote the following:

> In an arson case, for example, where a confession was obtained from a weak-minded person under arrest by telling him that the best thing he could do was to own up, giving him a drink, and taking him handcuffed to a lawyer's office where he was examined with the doors locked and in the presence of those who were hostile to him, the court held that such a confession was not voluntary even though no inducements were offered. The court said: "Legally and morally a more serious offense was committed in the efforts to extort a confession than the respondent was guilty of, even if his confession was true, as it was a perversion of the process of the law—'a poisoning of the fountains of justice.'. . . It is surprising how many cases still come to light in which such methods as these are used—methods which come very close to systematic torture, either mental or physical, and which seem more like the Inquisition of the Middle Ages than the just functioning of a present-day institution" (*12*, 41).

Experimental Methods. Within recent years attempts have been made to make some of the experimental methods of psychology do service in determining guilt or hidden knowledge. From psychoanalysis have

come the association tests, and from the field of emotional experimentation have come the expressive methods. The association tests aim to tap the individual's stock of associations. The individual is given a number of words and is asked to respond to each as quickly as possible with the first word that comes to his mind. Certain of the stimulus words bear significantly upon outstanding features of some crime, while the other words are assumed to have no connection with the crime in question. A record is kept of the time between stimulus-word and the response. If the *critical* words give a larger reaction time than the non-critical, or if, on the whole, the character of the words given is peculiar, guilty knowledge is assumed. The second group of experimental methods, which have been used in detecting guilt, stress the bodily changes which are assumed to accompany emotional states. The guilty are assumed to grow emotional when placed under experimental conditions and quizzed about certain events. One form of these methods has been used by Marston. In his studies, the individual is tested while giving his story and under cross-examination. Tests are taken of systolic blood pressure at regular intervals and graphs are constructed to show any significant departure from normal pressure. Investigations of a somewhat similar nature are being carried on by Larsen and others. In his work, Larsen makes use of changes in heart and breathing rate (rhythm). Blood pressure is also measured. Of his test Larsen writes:

> In practical use this test has been utilized not to gain a conviction but a knowledge as to the identity of the guilty party and from then on ordinary police procedure is followed. Thus the accused usually confessed and this confession is written and then serves as evidence. In all cases the suspect submits voluntarily. It has been found from actual experience that the recidivist and the clever crook is easier to detect than others. In several cases medical students and physicians have been detected although they tried every known method to prevent detection. . . . By way of recapitulation we may add that there is no test in its present state which is suitable for the positive identification of deception and suitable for court procedure. The test which the writer is now using attempts a check on the past methods as well as the application of a graphic record which depicts the emotional wave. The importance of this method is that the wave is photographed upon a record which is permanent and if ever the results are positive for court procedure the effects of deception can be studied by qualified experts in the court room. However, if this stage is ever reached it will be only by careful standardization. This work with the graphic method is suggestive and the errors to be contended with will be those of interpretation. This can only be improved, if ever, by much coöperation and experimental work. Then we will be able to determine how far, if at all, a deception test can be relied upon (*10*, 626).

We must point out that even if such tests were to be fully perfected so that a high degree of reliability could be placed upon the outcome, little use might be made of them in the court room because they can be considered as a violation of the old principle that an accused individual cannot be forced to give evidence against himself. The use of such tests would probably be looked upon as a method of obtaining compulsory confessions. On the whole, the results of this type of test have been encouraging. They do indicate one possible way of attacking objectively the problem of guilt.

Some methods of determining guilt are quite new; others are quite old. The use of the association test and the expressive methods belong to the first sort; the trial belongs to the second sort. We must deal for moment with some of the psychological problems concerned with the court room as it bears upon the criminal. Our task touches the judge, the jury, the lawyer, and the witness.

The Judge. A complete discussion of the psychological aspects of a judge would involve us in a consideration of the general problems of the normal human adult. A judge is a man who has his prejudices, his own fond beliefs, his moods and emotions, and his habits of thought. He has, along with his other characteristics, his possible limitations and shortcomings in point of view and philosophy of life. We cannot possibly consider here each of the many psychological problems of the judge as a man.

We find a major psychological aspect of a judge in the form of prejudices. Although the average layman commonly thinks of a judge as being coldly impartial, it is generally realized, both among judges and lawyers, that deep prejudices may profoundly color a judge's decision.[1] Occasionally, we may actually find a widespread agreement among the people concerning the unfitness of some judge because of his strong prejudice. Only recently the President's first choice of a successor to Justice Sanford has failed to meet with the approval of Congress because of an alleged prejudicial attitude toward both an industrial class and a whole race of people.

Lawyers frequently select those judges, where such selection is possible, with whose prejudices upon a particular matter they are familiar. They well realize that under such conditions they have a

[1] "Quite frequently it is common knowledge among members of the bar that a judge is prejudiced in a certain direction. Thus it is said that before one judge it is impossible to have a will set aside for any cause. Another judge may lean toward labor or capital in the struggle for economic leadership. Still another judge may be strictly opposed to the theory of capital punishment" (3, 62).

much better chance to win their case.[1] At times a judge, perhaps realizing his own private leaning and desiring to be impartial or wishing to prevent giving a bad decision that may be reversed, may frankly request another judge to serve in his place. At other times, a change in venue is possible. This usually makes possible a trial under conditions in which fewer judicial prejudices are operative. Among the more outstanding factors which produce prejudice in the judge we recognize race and sex. Brown mentions fraternal orders, age, health, religion, sports, and friends as some of the factors which enter into the mental make-up of a judge and which vary the justice of his decisions.

Judges are inclined to be swayed more by reasoning and less by suggestive appeal to the emotions. Even if a judge were emotionally inclined to render a decision (based on invalid grounds), he might find his decision overthrown by a higher court. Perhaps the fact that so many decisions of the lower courts are reversed by the highest judges of the land indicates the presence of prejudice and emotional bias, with a resultant inability in the lower court judges to rest decisions upon the true facts of a case. Of the rôle of reason and emotion in the life of the judge, Arnold writes quite pertinently:

The existing ideal of a Judge appears to be that of a kind of abstract man, in whom all emotion is wanting and only intellect remains. Further, this intellect rests mainly on a knowledge of the textbooks and precedents of the law, and the power of drawing acute and fine distinctions which will serve to restrict the view to the narrow limits of such learning, prevent the mind straying into the broad paths of experience of life, and so attain certainty and uniformity in the law. This intellect is necessarily of an over-cautious type as it is bound down by rules which it must always be on the lookout not to transgress, and the compliance with which is for it the necessary condition of the existence of law as a Science: it is further divorced from emotion, which is the source of confidence, and utilizes whatever it finds ready to hand. This over-cautiousness is often intensified in England by the excessive age of the Judge and his consequent well-known tendency to distrust new ideas and look only to the past for guidance. Lastly, this despising of emotion, reliance on intellect and ideal of uniformity and certainty, and the building up of a science of law, leads the Judge to be satisfied if his decisions comply with abstract rules and an artificial procedure, and to be indifferent to the effect of his decisions on the litigants.

[1] "Many an industrious young attorney who has been bitterly disappointed by a defeat in a legal controversy, later learns that the result was due to a prejudice to which he had given no attention whatever. He had proved his case, but it was decided against him. These uncertainties in the administration of justice are the cause of much severe criticism, but the fault is not in the law alone, but in the frailties of human nature" (*11*, 243).

We venture to uphold the view that the first object of the law should be to promote justice: the chief qualification for this on the part of the Judge is the ability to enter into the feelings and thoughts of those who come before him. The real meaning of life lies in the part which purpose or individualism plays in it, and the emotion which enters into it. Interest and passion obtain throughout and cannot be neglected. These can only be grasped by imagination without which a Judge cannot get at the truth of facts. Well do we know the case of the rustic witness who denies he knows anything for fear he may be brought to court and involved in trouble, but afterwards admits that he saw the whole occurrence. He as often as not is disbelieved by the Judge, who has not sufficient imagination to put himself in the place of this Burman agriculturist and finds it safer to discredit him on the ground that he has contradicted himself. The Judge who eviscerates all his emotions and applies strict rules of evidence to exclude much information which bears on the case may arrive at impartial decisions, but they are empty ones and often mistaken. We do not want then a Judge without feeling, but one who will enter into individual circumstances and consider them, and will not trust to general rules and award punishment according to normal scales. We do not want one who thinks he must put on a special judicial attitude when he goes on the bench and cast off all his humanity and ordinary ideas of life (*2*, 69).

Judges differ markedly in the type of sentence which they pronounce upon criminals. In many cases, of course, a minimum sentence is made mandatory by law. In a great many cases, however, judges enjoy considerable freedom in determining the length of sentence. Here appears the psychological element. He may be sympathetic and give light sentences; he may, however, be unsympathetic and impose heavy sentences. Some judges, for instance, are widely known for their unbending hostility to all delinquents. The most striking feature, however, of the whole matter of sentencing concerns the tendency of judges to pronounce sentence in terms of a certain number of months or years. Münsterberg writes that "observations and statistics show that his decision is to a high degree dependent upon the psychological preference of the individual judge for particular figures. Years of detention in prison are added simply because the psychological mechanism of the individual judge automatically prefers one or another figure."

From a study upon the sentencing habits of judges, Francis Galton (4) found the following rather striking results. In the one column, we find the length of sentences, and in the other column, the number of sentences imposed by judges.

Consider these results. While there are 150 sentences for a length of 15 months, not a single sentence is given for 17 months. Twelve times more sentences are given for a period of 5 years than for a period

Length of Sentence Months	Number of Sentences	Length of Sentence Years	Number of Sentences
15	150	3	360
16	30	4	60
17	0	5	250
18	300	6	20
19	20		

of 6 years. Truly, the criminal is lucky who draws a judge who thinks both in small numbers and in fives rather than in sixes or sevens or eights.

The Jury. The psychology of the jury is very complex. In the juror, we have of course the "individual" side of man's psychological make-up. In addition there are the many psychological phases which appear because man is thrown into a group. If he is suggestible, we find him tending to be more suggestible. If he is anti-social and non-coöperative, he may seek, regardless of the evidence presented, to stand strictly aloof in opposition to the others. Partly because they are in a group, jurymen are more emotional than intellectual. As Münsterberg (*14a*) remarks, "Each one thinks less reliably, less intelligently, and less impartially than he would by himself alone" (p. 185). They have their prejudices, their likes and dislikes, their leanings the same as the judge. They probably differ from the latter, however, in not holding these in such rigid control.

The average individual prefers a jury trial to a trial by judge. He feels that the jury will not draw artificial distinctions. Decisions with it are not such cut-and-dried affairs as they are with some judges. Münsterberg expresses this matter of the jury quite simply. It is better, he remarks, "to have some statutes riddled by illogical verdicts than legal decision severed from the sense of justice which is living in the soul of the nation." The members of the jury are probably more able to place themselves in the position of the defendant. They are nearer his level.

The jury has sympathy for the masses. It has no veneration for the technicalities and niceties of the law. It dispenses rough justice which, often, is more nearly real justice than would be possible under the rules of law alone. The jury as the trier of fact is in the realm of its everyday activities, and it uses its common sense in analyzing facts and weighing the evidence. It often senses the truth through its common knowledge of human nature. It is therefore probably true, since the judges, by training, temperament, and experience, are strict legalists and little swayed by emotion, that the jury is the emotional balance wheel in our legal system. It has been greatly criticized and its abolition has been repeatedly advocated; but, in spite of the difference

of opinion as to its effectiveness, it is undoubtedly the stronghold of democracy in the judicial system. From a psychological as well as from a practical standpoint it is a grave question whether it would be advisable to take our courts any further away from the people (*12*, 134).

Another student maintains:

The jury's homely experience, its touch with human affairs, its constant contact in everyday society with the types of men and women who appear as litigants, endow it with a special ability, an inherent intuition, an innate acumen to see and know what the real facts are. . . . With twelve men, drawn at random from all walks of life, there will, perforce, be a balancing of prejudice and sympathy. And if it be said that the result will be only a compromise, who shall say that that result is not equitable? When conflicting rights of citizens overlap, or divergent theories of social or business conduct clash, there must be a mutual cession of privilege and a mutual refinement of principle in order to preserve harmony and blend the various factors into a common rule. Compromise is the essence of civilization. It cannot be fully embodied in the law, but the concerted action of a group of men must always invoke it (*5*, 509f).

The juror is not a scientific searcher for truth. His task is to decide from the evidence offered. The major problem of the lawyer in dealing with a juror concerns the sort of evidence which will satisfy his mind. He is to be favorably appealed to without arousing antagonism by running counter to his prejudices. A good impression through subtle suggestions is the surest way to the juror's mind. He is not inclined to follow some closely knit chain of reasoning. He is inclined, at times, in keeping with most people, to reach decisions on the basis of minor impressions. The prestige of a lawyer or a witness, or even a certain kind of showmanship on the part of a lawyer, may turn the tide in a case. Jurors are like most people—they are averse to prolonged use of the head for purposes of thinking.

It is the notion of some that the average jury composed of farmers, laborers, or business men is less capable of sifting the facts and arriving at an impartial verdict than is a group of professional men. It would appear, however, that extensive training in the ordinary professional lines does not give a man an advantage over the non-professional. It seems that persons with ordinary high school training serve as well on juries as do those with college or professional training. To determine the truth in many cases is a hard task. Judges themselves disagree. Concerning the difficulty which judges sometimes experience in arriving at the truth from a mass of factual material presented as evidence in the court, Miller remarks as follows:

An experience of twenty-five years on the bench, and an observation during that time of cases which come from all the courts of the United States to the Supreme Court for review, as well as of cases tried before me at nisi prius have satisfied me that when the principles above stated are faithfully applied by the trial court, and the jury is a fair one, as a method of ascertaining the truth in regard to disputed questions of fact a jury is in the main as valuable as an equal number of judges would be, or any less number. And I must say that in my experience in the conference room of the Supreme Court of the United States, which consists of nine judges, I have been surprised to find how readily those judges come to an agreement upon questions of law, and how often they disagree in regard to questions of fact, which apparently are as clear as the law. I have noticed this so often and so much that I am willing to give the benefit of my observation on this subject to the public, that judges are not pre-eminently fitted over other men of good judgment in business affairs to decide upon mere questions of disputed fact (*15*, 863).

The Lawyer. The psychological problems of the lawyer are again those of the normal adult. We find that his knowledge and abilities are shown in the logical preparation of his case, in the picking of the jury, in the selection of witness, and in the use of clever suggestion and clear argumentation during the course of the trial. We might profitably glance at some of these problems.

The old proverb, "well begun is half done" applies indeed to the selection of a jury. Everything, we might say, is done for the benefit of the jury. The whole court procedure revolves around it. Before it the witnesses slowly parade, the lawyers cleverly perform, the defendant sadly poses, and the judge ponderously sits. A lawyer simply must know his jury. Long before an important trial begins, a lawyer strives to learn something of the prejudices of the prospective jurors. He learns whether any have cause for grievance—economic, political, professional. If a debt has been pressed, an appointive office withheld, a professional code violated by the defendant to cause unfavorable prejudice, the prospective juror is to be dropped. Always, the lawyer keeps before him the mental attitude of the jury. If a lawyer is unable to secure men who are actually prejudiced in favor of his client, he sees, so far as possible, that they are neutral.

A lawyer has an important function in the selection of witnesses. Before the trial, possible witnesses are often visited. Partly through flattering the witness by being the first to call upon him, the lawyer tends to create a favorable impression. Moreover, the first approach may result in the witness committing himself to some position from which he cannot very well retract. He is, then, definitely on one side. The

lawyer sees that his important witnesses are partially habituated to court room procedure before they are placed on the stand. Where a witness is likely to be unduly disturbed emotionally by the court room and where it is possible, attendance in court prior to taking the stand is insisted upon. Moreover, the efficient lawyer makes a point of developing some coherence in the testimony of the witness. Too many persons do not think straight about matters of testimony, even though they may be quite desirous of telling a true story. A little coaching in this way by the lawyer formalizes the steps for some individuals and so makes good witnesses out of poor prospects.

Throughout the whole of a trial, the lawyer is continually on duty, ready at any moment to defend his client's cause. He works subtly upon the judge; he handles the witness to bring out the material favorable to his side; he continually appeals by word, by gesture, and by his very posture to the jury. He may actually seek to intimidate the judge into deciding with him by giving the impression that, if his case is defeated, he will carry the case to a higher court for a possible reversal. By skillful use of suggestion, he tries to bring out the evidence which he wishes from the witness, or he seeks to discredit the evidence of the witness for the opposing side. He bombards the jury with fact after fact; he pleads emotionally with them in their rôle as fathers, as sweethearts, as captains of industry, or as men of a particular class. He subtly flatters their vanity; he calls urgently to their prejudices; he appeals stirringly to their sense of duty. He paints vividly in terms of imagination a picture of a desolated home, a bereaved wife, a fatherless child. He pictures the inexpressible longing of the sorrowing one

> For the touch of a vanished hand
> And the sound of a voice that is still.

Occasionally, he may even turn theatrical. The court room momentarily becomes a stage, and the lawyer, if clever, an effective actor. A certain amount of acting is necessary in a lawyer. He is being observed all during the trial.

His demeanor and actions are considered as important in disclosing his mental attitude on the case. That which he does, helps to create the proper atmosphere for the trial. Many attorneys have quite a bag of tricks which they use as occasion demands. Most of these, however, are cheap theatrical stuff. Such methods are not very creditable, and are not given as worthy of emulation, but as illustrating how simple and yet how subtle and effective such tactics may be. It shows the importance of appearance and bearing and the power of suggestion to which we have already referred (*12*, 605).

The Witness. We have referred indirectly to the witness. We must now consider in greater detail some of the psychological problems in this connection. The witness is a perceptual, memorial, imaginative, emotional, suggestible creature. And he has his obvious limitations. He can remember—sometimes too much and again not enough; he frequently overworks his imagination to the consternation of the counsel; he loses his head, and in his confusion he admits more than the situation demands; and he is only too frequently led by skillful questioning to believe and to testify to things which have no factual foundation. Through proper approach he may become loyal to one side and antagonistic to the other. He exhibits prejudices both for and against the one side or the other. With all his shortcomings, he remains, nevertheless, an object of vital interest to the psychologist, the judge, the lawyer, and the jury.

The average witness takes the stand with a bias. The lawyer realizes this and, so far as possible, uses it to his advantage; or if the attitude is antagonistic, seeks in a clever way to mollify the witness. He knows that little can be gained by disregarding it, and even less can come from attempting to force the sympathies of the witness. Bias comes out clearly in the case of the expert witness. While it is true that the side that has hired the expert, has not "bought" him, nevertheless, he is there to testify for that side. Because experts are paid, jurors sometimes feel that their evidence cannot be worth much. It is too "one-sided." In fact, the opposing counsel may deliberately seek to bring out suggestively the extent of the fee of the witness and so disparage his testimony. In a recent murder trial which the writer attended, a ballistic expert, who had been engaged by the state to testify concerning the relation between a gun belonging to the accused and two fatal bullets, was questioned by the defendant's counsel concerning the amount he expected to receive for testifying. These as well as other questions of a like nature were obviously intended to place the witness in an improper light before the jury and to lessen the value of his testimony.

Not infrequently witnesses deliberately resort to lying in order to remain loyal to some person, or in order to maintain their self-respect. They jeopardize their freedom and their property through perjury for the sake of some friend. Or they may lie in order to prevent acknowledging that they were previously wrong about some matter. There are "honest and well intentioned people," we are told, "who, when they go on the witness stand, unconsciously distort the truth—exaggerating one circumstance and minimizing another. Under cross-examination

by lawyers of a certain type they become antagonistic, throw truth to the winds and stick to any mistaken statement they have made without regard to its obvious falsehood" (*12*, 246).

Some persons, then, apparently make good witnesses, and some do not. The most desirable witness, according to Train, is the "quiet, tractable, conscientious, unimaginative type" who tries to give the information sought without attempting to display his knowledge. The shortcomings of witnesses take many forms of which ignorance is not the most insignificant. Some witnesses apparently do not know the difference between the statement of a fact and an inference drawn from a fact, or the difference between an *opinion* and a *fact*. Such persons often become emotional—bewildered or angry—when the judge warns them merely to answer questions by stating only the facts.

Despite all the caution that is supposed to be created in them by their solemn oath to tell the truth, witnesses are, nevertheless, quite suggestible. We usually recognize that the safest preparation against suggestion lies in having clean-cut notions about some topic. In order to prevent a witness from becoming confused through subtle questioning by the opposing counsel, it is advisable for a lawyer to go over the case with the witness before he is called to the stand. In this preliminary review it is also good psychology for the lawyer to assume the initiative and go through the story as he knows it. In this way he may strengthen the witness in uncertain points. He may also avoid "fighting" the self-respect of the witness, who may have only a very vague notion about something, but who, once having told a certain story, sticks doggedly to it, although he may realize that he is not at all sure about the matter. That is to say, once the prospective witness gets his "head set," it is indeed difficult to change him. But if he had not earlier been given a chance to "get set" in this manner, the trouble would have been avoided.

An outstanding condition of suggestibility takes the form of leading questions. A certain sort of questioning may lead even the critical adult astray. And it virtually destroys the value of testimony of a child. Brown remarks that "a child is extremely suggestive." A lawyer, if he desires, "can so lead the child by indirect suggestion that the evidence will be wholly false and unreliable. When the evidence of a child is of great importance, as it is sometimes, the only safe course is to fix the truth definitely in the mind of the child before the trial" (*3*, 133).

PROBLEMS OF TESTIMONY

The purpose of the witness is to give evidence. Other things being equal, the decision as to the guilt of an accused individual rests, we as-

sume, upon the nature of the evidence advanced by witnesses. Since this phase of court procedure is so very important, it has been given a great deal of study by the lawyer and by the psychologist. The former has sought to attack the problem by asking what evidence should be accepted and what should be rejected. Thus the witness is not permitted to give testimony that is of the nature of inference or hear-say, or opinion. If the witness gave his opinion, the juror, it is alleged, would make it his own. In his work here, the lawyer is limited largely by precedent. But the psychologist, unhampered by tradition, has sought to attack the problem of testimony by way of experimentation. He recognizes, for instance, that the testimony of a witness is simply a report of his previous experiences in connection with some events as he is able to recall them in the court room. The psychologist assumes that three major sets of conditions are operative in such reports. Each of these conditions plays an important part in determining the nature of the testimony; that is, in determining its truthfulness or its reliability. These three sets of factors are the conditions at the time of the original experience, the conditions of the interval between the time of the original experience and the time of recall, and the conditions which operate upon the individual at the moment of recall. That is to say, an individual must observe, then after a time remember. If he did not or could not observe in the first place, he would possess no value as a witness. If he could not remember, he would be utterly worthless as a witness. Each of these sets of conditions constitutes a major psychological problem. We shall consider each with respect to our general topic.

Conditions at the Time of the Original Experience. Good witnesses are those who observe widely and accurately. Such persons, however, are seldom found, for most persons observe very little of what occurs around them. We recognize that what an individual observes depends upon a number of factors. Among these we list the *condition of his sense organs, the span of his perception, his psychological set at the moment, his strong tendency to confuse inference with fact,* and *his emotional state.*

Sense Organs. Poor perceptual ability owing to weak or defective receptor organs is undoubtedly a condition which frequently makes testimony unreliable. One who is near-sighted or color-blind cannot possibly report as truthfully concerning the nature of some happening as another who possesses normal vision. Or persons who are blind in one eye cannot judge accurately the location of an object. In case of an accident, they may maintain, contrary to the fact, that one object, for example a car, was in the clear. As an illustration of the significance of the receptor organs for the court, let us consider the following remarks.

Osborn, in *The Problem of Proof*, writes of tests made by Jastrow on perceptual abilities:

> These tests were made with persons of intelligence and approximately of the same age. It was found that seeing ability ranged from one hundred per cent of accuracy in eight minutes and thirty-five seconds with one observer, to sixty-five per cent of error on the same tests, in nine minutes and fifty-five seconds with another observer. It is easy to understand in what peril the interests of justice would be if that second observer, unconsciously half blind, was called upon in a court of law to decide a delicate question appealing to the sense of sight (p. 392).

Span of Perception. Another condition affecting the truth of an individual's statement concerning a number of events happening simultaneously is the number of objects which an individual is capable of grasping at any given moment. We know that where too many things (8 or 10) occur within a brief space of time, a person cannot perceive all of them. Only about half of this number may be apprehended. Under some conditions, perhaps even fewer objects will be gotten clearly enough to insure faithful reproduction at a later time in the court room.

Psychological Set. While the above two conditions are important, this factor is even more so. Set means that we constantly carry the results of our past with us in the form of fairly definite inclinations to perceive and to act in certain ways. Our past, we say, colors every experience. We see only through the "blur" of our previous perceptions. As normal adults we seldom—perhaps never—come to situations in a wholly neutral frame of mind. As a result we observe the things which interest us, and we miss the things which do not interest us. For instance, the entomologist, the botanist, and the artist who walk together across a meadow do not see the same things. The one sees insects, the other notes the plants, the third perceives the beauty of the earth and sky. Again, a detective placed at the scene of a murder does not see it as does the undertaker. The detective is set, it is true, but he is set to see facts pertinent to the case in hand. We recognize in this connection that considerable improvement in observation may come through training and with the definite intent to be able to reproduce events accurately. Of this point Münsterberg writes that "the laboratory tests show that the ability to give correct reports can be systemically developed. If experiments are carried on in which the subject is required to give exact descriptions, the percentage of correct statements rises steadily" (*17*, 401).

What we have said here of set might well go under the head of interest or attention. We know that we see what we are interested in and we miss that which is of no interest to us. How often do we hear in-

dividuals say, "I did not see or hear that—I was interested in what was going on over there." We know that knowledge increases our ability to perceive. Where there is ignorance of machinery, an individual may see only confusion. We know again that if he perceives at all, the raw recruit experiences the intricate maneuvers of an army as being largely chaotic in character. The seasoned veteran, however, perceives a clock-like precision and an orderly arrangement of details.

Inference and Fact. We have referred to the very obvious tendency of many to confuse inference with fact. Many believe they see when, in fact, they only infer. The skilled juggler, in fooling his audience, constantly takes advantage of this human weakness. If he did not, his usual, clever performance would be a failure. The séance also capitalizes upon this same treacherous tendency. No one conversant with the facts of human behavior in the séance will accept the statement of the average visitor at spiritualistic meetings. Again, a witness testifies that he saw the defendant choke the victim. All he really saw was the stretching forth of the hand. Another swears that he saw the defendant jump upon the victim and strike him. Perhaps all he actually saw was the first set of movements.

Emotion. One final condition which operates, as we have said, against a reliable report because of faulty observation is the emotional state of the individual at the time of the original experience. It has been repeatedly pointed out that the excited person sees very little. We may rush excitedly past our best *friends* at the time of a fire without seeing them. A "wild" animal in the excitement of the chase may rush among human beings or into houses. The factor of emotional disturbance is so important that it must be ranked in this respect along with mental set. The astonishing differences among the reports of various spectators concerning some event must be explained partly in terms of emotional interference with observational processes.

As an illustration of a study upon the ability of highly educated individuals to observe and report upon an event, we refer to an experiment performed during a session of an association of lawyers, psychiatrists, and psychologists meeting at Göttingen. Two persons rushed into the assemblage, wrangled for moment, and rushed out. The president (who alone knew the act) called for a written account from

Number of Men	Important Facts Omitted or Unreported
1	20 % and less
14	40 % and less
12	50 % and less
13	more than 50 %

each member. The results were quite striking. They appear on page 468. Here, for instance, 13 out of a total of 40 men reporting omitted or failed to report 50% or more of the events which actually occurred. In addition, among these highly educated individuals, there were 24 who not merely failed to report all that happened, but who actually wrote down erroneous reports. Approximately 10% of such reports were pure inventions!

Conditions during Interval. An individual may experience an event quite clearly upon some earlier occasion, but be unable later to give reliable testimony because of a loss through the lapse of time. The interval between an original experience and its recall exacts its penalty. Even the clearest of experiences tend to grow dim with time. The organism gradually loses its hold upon the past. With passing time the memories of men slip from them. Old associations decay and disintegrate. What was earlier a closely integrated pattern is now comparable in a way to a moth-eaten garment. There are many holes or gaps in it.

The effects of the interval upon previous experience are clearly shown in the phenomenon of retroactive inhibition. If one reads a series of non-sense syllables and then turns immediately to another list, the second tends to interfere with the retention of the first. What an individual does immediately following the observation of some accident or crime may determine to a major degree the nature of his subsequent report. He may either report very little because of his loss, or he may bring in what he actually saw later and make it a part of what occurred earlier. Persons repeatedly testify that they cannot recall something because they were greatly shocked, called away, or were forced to do something else immediately following the occurrence of some event. And they frequently report something as occurring at the same time or earlier, when in fact it occurred later. Persons say, "I did think it happened at the same time, but now I recall that it occurred later.

The interval affects an individual in such a way that he tends to omit items with the result that his account is patchy. But such an account may obviously be unsatisfactory to an individual. Most persons desire the testimony or the story which they give to be consistent and logical. Not infrequently items are unknowingly inserted in order to give a more coherent and smoothly running account. The main framework of the original experience may remain intact, but the filling in may be largely fictitious. Error occurs as a result of the realization that some item was previously there but which cannot now be recalled. Something else may then be substituted for it. It may be that the substituted

object or event has been picked up by hearing or reading an account of another about some occurrence. The individual takes that which he has heard or read for his own.[1] It may be that continued pondering over some occurrence, or imagining what might have happened, may account for no small part of the disturbance commonly found in recall. In this connection Swift writes:

> We think of what we wish had happened, of possible interpretations of actions, and soon we are unable to distinguish between things that actually happened and our thoughts about what might have occurred. Our wishes, hopes, and sometimes fears, are the controlling factors. At times this takes a form that may be called retroactive memory. Knowing what we ought to have done on a given occasion we think the action into the memory series (p. 279).

Testimony is unreliable, then, because of the transposition of object or events in time or in space. No object may be omitted; no wrong insertion or substitution of objects may occur. Yet the individual puts first or last the object or event that actually comes in the middle of some sequence. Or an object is moved from one part of the scene to another part of the scene. A bed is moved from the kitchen to the parlor; an individual, perceived a day after a crime, is reported as having been seen a day before the crime. Swift summarizes this whole matter in the following words:

> Actions are transposed, omitted, substituted, and inserted in the series of events observed. The mental attitude at the moment, personal bias, and suggestion are always exerting their influence; and reports of conversations are subject to the same inaccuracies. Statements are misunderstood, qualifying remarks pass unnoticed, views are perverted, opinions added, and much is forgotten. Then that which has been lost from memory is replaced by products of the imagination. The speaker is made to say what we think he should have said—what we would like to have had him say; and in this last, the personal attitude toward the one whom we are quoting, or toward the whole situation, is a large determining factor (*27*, 289).

Conditions at Time of Recall. The acid test of the accuracy and the extent of observation is how much an individual can reproduce. The *functional* test of all observation and retention is recall. One may claim to be able to see much and retain much, but if he cannot recall much,

[1] "Even the repetition of the testimony by the same observer lowers its value. Experiments indicate that the second report is often less based on the memory of the actual experience than on a mixture of experience and first report. Then the false additions in the first report are likely to be starting points for further illusions" (*17*, 401).

his claim is meaningless. The final concern of the court is how much and how accurately the witness can recall. We have seen that the reproduction of some earlier experience depends upon the character of the conditions, both inside and outside the organism at the time of the original experience and during the interval. But it also depends upon the actual conditions at the time of reproduction. A proper evaluation of testimony demands that some consideration be given to the many extra-organic and intra-organic conditions present at the moment of recall.

We cannot overlook here the excited and emotional state of the witness because of the unfamiliarity with court rooms and court room procedure. Moreover, there is the factor of his heightened suggestibility. A witness realizes, as he takes his place before a large group of persons, that he must maintain his self-respect as a credible witness. The average individual is clearly unwilling to make a poor showing before a group. If he has good reasons for believing that something happened, if it seems that he is "expected" to have seen it, and if he feels that not to have seen it would in some manner reflect upon his ability to perceive, he is quite likely to include it in his account. Then, if it appears that he is wrong, in order not to lose his "self-respect," he may stick doggedly to his original account. Again, the novelty of his being questioned closely by strange lawyers may disturb the timid and retiring witness.

In addition, the very form in which the questions are asked the witness may destroy the value of his evidence. Furthermore, the way in which he gives his testimony—whether in narrative form or only under interrogation, is important. It is generally agreed that questioning increases the range of recallable details. According to Münsterberg, the number may be doubled. But the accuracy of the testimony decreases. One is inclined to tell more than one actually knows, and each question is a further temptation in this direction. The narrative form, however, gives fewer facts but greater accuracy. Again, an ambition of the witness to show off before a group may seriously affect his testimony. Finally, his realization of his inadequacy to express himself in a way demanded by the court, although he may be fairly sure of himself, may greatly disturb the witness.

Of the various conditions at the time of recall, which affect the reliability of known testimony, no one is more important than suggestibility. Several factors operate to heighten the suggestibility of the witness. The form of question put to the witness is, perhaps, the most important of all. A number of different forms of questions may be

used. The particular type depends largely upon the purpose of the questioner—upon the point which he wishes to develop. For high reliability one form of question is desirable; for a low reliability, another form may be used. If the opposing counsel desires to disparage a witness, and the court permits, he may use certain questions which may result in "tying the witness in a knot." Although the witness may be quite honest, the lawyer may cause him to contradict himself repeatedly.

An illuminating study was made by Muscio upon the influence of the form of question. He presented scenes by means of the motion picture to 56 subjects, after which he had them answer a number of questions based upon the observed events. Questions using the definite (the) and the indefinite (a) articles with the negative (not) were used. If we were to formulate illustrative questions, they might run as follows: "Did you see *a* body?" "Did you see *the* body?" "Was there *a* body in the car?" "*Wasn't* there *a* body in the car?" Another form of questions used was the "or" type, or the incomplete disjunctive. To illustrate: "Was the body in the car that of a young *or* a very old man?" According to this, the body should be either young or old. But it might be neither. Finally, there is the implicative type in which false implication may exist. To illustrate: "What kind of hat was the woman in the car wearing?" This means that (1) there was a car, and (2) a woman who wore (3) a hat.

Concerning the results of Muscio's study upon the factors of suggestibility, caution, and reliability, we read:

> Changing the indefinite into the definite article in a question form decreases suggestiveness, caution and reliability. The introduction of a negative into a question form increases suggestiveness and decreases caution and reliability. When the definite article and a negative (*e.g.*, *not . . . the*) were both used suggestibility was decreased, but caution and reliability were increased. The implicative form gave the lowest results for suggestiveness, caution and reliability. The incomplete disjunctive form possesses a relatively high suggestiveness, a relatively low caution and a relatively low reliability. . . . The most reliable form of question is one which contains neither a negative nor a definite article (*19*, 384).

We have now reviewed a few of the more outstanding facts concerning the nature of crime, the causes of crime, the characteristics of the judge, juror, lawyer, and the witness. We have found the defendant guilty. We must now consider the further problems of the way in which he is to be treated. Here we have the specific topics of criminal responsibility and the theories and practices of punishment. We must realize that the attitude of the court toward the problem of criminal responsi-

bility is different from that of psychology. We wish to devote a moment to the way of each.

THE PROBLEMS OF CRIMINAL RESPONSIBILITY

From the Standpoint of Law. A proper understanding and treatment of delinquents rests upon the position which is assumed toward the problem of the responsibility of the delinquent. In fact, the nature of the criminal's conduct and the type of treatment to be accorded him are intimately bound up with the general problem of his responsibility. The question, "Whom ought society to punish?" is a very difficult one to answer. It touches closely upon the subtle problems of human motivation, human intention, and human understanding. No one can be held legally responsible for his behavior if it can be clearly shown that in his intentions he was unquestionably opposed to committing some act. The individual who is forced through the threat of certain death to commit an act cannot be judged guilty before the law. Neither can the law hold for accounting those individuals whose actions are considered to be purely accidental; that is, over *which the individual has no control.* This does not include, of course, those actions for the prevention of which the individual has not made adequate preparation. In other words, if an individual realizes that because of some possible action of his an injury to another will result, but fails to provide precautionary measures, he may be held to be criminally negligent.

One psychological problem of great significance to the student of law concerns the nature of criminal motives and criminal intent. We say that a man *intends* to act in a certain way because of some *motive.* Intent is perhaps best thought of as an aim or purpose. Motive is best understood as a drive, a push, or a "reason." The average individual is always conversant with his intentions; they are usually quite easily verbalized. But motives are frequently quite obscure. In many cases they are wholly unknown. While an individual may frequently bring forth many "reasons" to account for a particular act, no one of them may be the true reason. One can say that he likes to do this, or he dislikes to do that, but he frequently cannot say *why.*[1]

[1] "No one can render an account of all his likes and dislikes. But it is not necessary in order to behave ourselves with decency and discretion. Something may appeal with a peculiar, indescribable and inexplicable charm. Analysis of the charm is not necessary in order to see whether or not the course of action it leads to is or is not in accord with the ideals of conduct. The ability to compare action with the standards of conduct is the root of freedom. If we would escape the drive of the unconscious, we must regulate our conduct according to principles. If, however, we follow whims and fancies and thoughtlessly yield to desires, the unconscious bears us along and we know not whither we are going" (*16*, 27).

For legal purposes, a knowledge of intent is very important.[1] But in many cases the question of motive may not be raised at all.[2] Motive, we are told, "is the moving power which impels to action for a definite result. Intent is the purpose to use a particular means to effect such result. When a crime is clearly proved to have been committed by a person charged therewith, the question of motive may be of little or no importance. But criminal intent is always essential to the commission of crime" (*12*, 60).

The general distinction between intent and motive is clearly brought out by McDougall in the following manner: "Suppose," he writes, "that you are sitting in a concealed spot near a lonely road, and that you observe an acquaintance, X, walking alone along the road. Suppose, further, that you see a needy-looking man coming in the opposite direction; that, when the two meet they stop and exchange some words; and that X puts his hand in his pocket, hands some money to the other man, and passes on. How will you interpret that behavior of X?—You will be able to infer that the man begged alms of X, and that X gave them; further, you can infer that X, when he put his hand in his pocket, intended to find a coin and to give it to the beggar. About his intention, then, you are clear. But what about his motive? That remains problematic. Here we have a clear illustration of the obvious fact that motive and intention are entirely distinct facts. Yet many psychologists and some lawyers deliberately confuse them, or assert that a motive is merely an ulterior intention. There is no distinction of more importance for the understanding of behavior. . . . If X, when he put his hand in his pocket, had pulled out a pistol instead of a coin, and had put a bullet through the other man, the question of motive would have become a matter for the lawyers to discuss. The intention to shoot at the other man might be confidently assumed, though the motive remained absolutely unknown.

"On seeing the coin given, at least three possible motives might be guessed with equal plausibility. You might guess that X was a timid person and that he gave the coin because he was afraid of the other man, afraid of being assaulted by him if he refused to give. Secondly, you might guess that X was a kindly man, and that he was moved to give by pity. Thirdly, if you were "inclined to be cynical," you might guess that X is a man who likes to feel himself superior to others and who

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[1] "To all crimes, except crimes of omission, intention is necessary" (*14*, 84).

[2] "When one examines the 19th Century criminal codes one is struck by the small part played by motives" (*21*, 29).

enjoys any situation that enhances his feeling of superiority to others and their sense of his power over them. . . ." (*13*, 121f).

Generally speaking, a man is judged in terms of his behavior (and perhaps his intention) and not in terms of his motives. Pollock points out that with rare exceptions, an act not otherwise unlawful in itself will not become an offense or legal wrong because it is done from a sinister motive, nor will it be any excuse for an act, contrary to the general law or in violation of any one's rights, to show that the motive from which it proceeded was good (p. 47). But there is apparently a slowly growing tendency today in some legal quarters to lay greater stress upon the motives back of action.[1] The building of spite fences or unsightly structures to disturb others is viewed differently today than it was years ago. Concerning this point of motives we learn from Dean Ames that in certain cases, in spite of the *wrongful motive* of the actor, "malevolently to damage another is lawful, either because the act is merely the exercise of an absolute legal right, or because it is justified by paramount considerations of public policy. Except in such cases, however, willfully to damage another by a positive act and from a spirit of malevolence is a tort even though the same act, if induced by a rightful motive, would be lawful." From a survey of many cases McCarty finds that more and more the insistence is upon motive and the mental attitude of the actor. "These are the tests that indicate real culpability. They are not the only tests, but they are vital in securing just results. As Justice Holmes said many years ago: 'The law is made to govern men through their motives, and it must, therefore, take their mental constitution into account' " (p. 86).

An attempt is clearly made in some cases to reveal the motive. The significance of the motive appears in those cases in which a man may do great injury to many other persons in order to save himself, and yet be held guiltless of misconduct. The individual kills, we say, in defense. Self-protection is a legally recognized motive. Moreover, the legal significance of the motive is very clearly shown in cases of insanity. In some states the individual who injures another while laboring under the delusion of self-defense cannot be held criminally responsible. The statutes of the State of New York enact that "no act done by a person in a state of insanity can be punished as an offence." Almost a hundred years ago, an English decision upon this problem was rendered somewhat after this manner: "In order to establish a defence on the ground of

[1] "An almost universal characteristic of the penal codification of the present time is the increasing consideration of the subjective elements in criminality" (*21*, 26).

insanity it must be clearly proved that at the time of committing the act the accused was labouring under such a defect of reason, from disease of the mind, as not to know the nature and quality of the act he was doing, or if he did know it that he did not know he was doing what was wrong" (*24*, 10). The motives may be wrong, but the insane are not supposed to know that—consequently, they are not responsible. The matter is complex, for the difficulty immediately arises as to what actually constitutes insanity. Smith, for instance, points out that "insanity has never been defined legally" (*24*, 11). He offers this definition: "No act done by a person in a state of insanity, or suffering from mental defect, to such a degree as to justify his being placed under care, treatment, and control, can be punished as an offence."

In general, the court asks whether the individual can determine right from wrong. If he can, he is legally responsible. It cannot grant that an individual may know that an act is wrong, and yet be literally forced to do it. It cannot, in general, understand emotional compulsions, or forced behavior of the kleptomaniac sort where petty thieving may occur, which is known to be wrong, but which the individual cannot prevent. Neither can it understand that *major crimes* may partake of the essential characteristics of the kleptomaniac compulsion; that is to say, that an individual may clearly know the difference between "right and wrong" and yet be wholly unable to avoid committing some anti-social act.

From the Standpoint of Psychology. Law differs to a major degree from psychology with respect to its attitude toward the matter of responsibility. The law assumes that individuals who commit crimes are "free" to choose one rather than another form of conduct; that is to say, they are able, for instance, to choose between right and wrong. It then follows that they are able to refrain from anti-social actions. Because criminals fail to restrain themselves, it is "logical, just and necessary to punish them." In short, modern criminal law is founded upon this notion of freedom. In this connection Rosanoff remarks:

> The current legal conception is based on the metaphysical theory of freedom of the will; the individual must exercise his will under the guidance of ethical principles; he is responsible for his acts unless, owing to immaturity or mental disease, he is incapable of distinguishing right from wrong and is thus bereft of proper guidance; when no such incapacity can be shown he must undergo punishment in proportion to the gravity of his crime: this punishment or retribution, which is nothing but a systematization of the original impulse of revenge, is now most frequently justified as a deterrent measure; but instilling a fear of similar punishment, it is supposed, society protects itself against

repetitions of the crime; under the influence of this fear responsible persons—*i.e.*, those capable of distinguishing right from wrong—will refrain from doing wrong" (*22*, 183).

Much of our law was written long before we came into possession of the knowledge which we now have concerning human behavior. Laws which go back to an outworn Blackstonian understanding of human nature are bound to conflict with the opinions of students formulated in the light of more recently derived and scientifically grounded information.

The psychologist maintains, that strictly speaking, a person cannot be held "responsible" for his actions. He assumes that an individual is the product of his heredity and his environment—one who acts in the light of his history. He thinks some thoughts rather than others, and he imagines one outcome rather than another because he has had certain needs and desires; and because he has thought or imagined along these lines in the past. The psychologist points to the reflexive, the compulsive, the automatic, the habituated activities as illustrative of what an individual does because of his past. He finds no "reason" in these cases for granting responsibility to the individual (if he were to raise the matter of responsibility). He assumes that the individual acts in these cases because he cannot do otherwise. In the so-called voluntary acts, the psychologist takes the position that desires and associations of a particular sort produce certain types of behavior. The individual is forced by his needs, by the type of thoughts which he thinks, by the set of the momentary circumstances to act in a given manner. He is not responsible in a metaphysical sense of possessing complete freedom to do as he chooses.[1]

The psychologist holds that the criminal is one who may have had a history different from that of most. His criminal conduct may be as much a part of his history as worshipful conduct is a part of the history of the monk. The psychologist believes that the criminal may be one who is "short" in intelligence or in emotional equipment and control. Under such conditions he cannot possibly be expected to show the behavior of a sort found in an individual possessing more intelligence, or in one who has a different emotional make-up. Or the psychologist assumes that an individual may suffer from some temporary glandular

[1] "The metaphysical theory of the freedom of the will has no place in science; the phenomena of the will, like other natural phenomena, are subject to natural laws and are determined by antecedents such as heredity, education, various environmental influences, and events immediately preceding a given act under consideration, that is to say, factors for the most part beyond the control of the individual; responsibility, therefore, in the sense of liability to profitless suffering in retribution for wrongdoing, does not exist scientifically in any case, sane or insane" (*22*, 184).

defect by virtue of which he acts in a way contrary to social standards. In every case he takes the position that at any given moment the criminal does the best he can with what he has to work with. He doesn't have the *same amount* as most,—he has too much or too little. That is one reason why he belongs to the criminal class. A remark of Schlapp and Smith is quite pertinent here. "Criminals are of two broad types, the deficient and the defectives. They are either of subnormal mentality or of faulty mental or nervous constitution" (*23*, 119). While we question the full truth of their statement, we do believe it is solidly grounded in fact.

The psychologist regards the criminal as being abnormal. He contends, for instance, that no man who is quite normal commits murder. "The killer is in all cases either temporarily or permanently deranged." Even the most intelligent criminal is regarded by some as a victim of deranged bodily chemistry. If to the deranged bodily chemistry group, another class comprising anti-social behavior patterns established earlier in life were added, we should expect to find most psychologists in agreement.

Law believes in punishment. Its notion is that the criminal must be mistreated to prevent others from becoming criminals, or to prevent the criminal, either temporarily or permanently, from doing more mischief; and to furnish him with an opportunity to review the error of his ways. Psychology holds, on the contrary, that since the criminal is clearly abnormal, he should be regarded as deserving not of harsh punishment but of scientific treatment with understanding as its object; or at least detention so that he cannot do further harm. The psychologist insists that the courts are sending to the dangling noose and to the electric chair hordes of individuals whose only fault may lie in a lack of normal ancestry, or in an improper history, or in the possession of a bad endocrine system. He maintains that intelligent treatment, but not punishment as it is usually conceived; sympathetic understanding, but not emotional condemnation should be the lot of those who transgress.

The psychologist insists that it is the height of absurdity to punish by solitary confinement or death those criminals who are feeble-minded, while society at the same time permits them to move about with full social rights even after they have shown themselves to be dangerous to social welfare. He holds that as soon as it becomes known that an individual is a social menace, he should be placed in an environment in which he can do no harm. He cannot view with sympathy any suggestion that the feeble-minded be allowed the social freedom enjoyed by

the normal. He knows that "many of those horrifying and nauseating crimes which have filled the pages of newspapers with black type and the heart of mankind with terror and disgust have been the work of feeble-minded men and women." But it also fills him with horror to see these, as well as other victims of uncontrollable circumstances, swinging "so black against the sun" or roasting in the electric chair. He looks forward to the time when society and the courts[1] will rid themselves of the antiquated notion that individuals freely choose criminal careers, —freely enter upon the path that leads to the one-way door—and recognize instead that behavior is as definitely determined by antecedent conditions as other phenomena of the world are. And with this recognition, an intelligent attempt will be made, he believes, to understand and to control the conditions which contribute to criminality.

PUNITIVE AND CORRECTIVE MEASURES

A crime, we said, is an act against society held to be deserving of institutional punishment. According to the law, the individual who has been found guilty must be punished. The nature and the extent of his punishment appear to be determined partly by the *theory* of punishment held, in general, by society and, in particular, by administrators of the law; and partly by the degree of responsibility of the delinquent in the eyes of the law and society. Some individuals hold to one, some to another theory. All current theories concerning the nature of punishment can be reduced to three: *viz.*, retributive, reformatory, and deterrent.[2] We wish to consider each of these.

Retributive Theory. This is undoubtedly the oldest of the theories just mentioned. Its keynote is revenge. The criminal has willfully injured—he must in turn be injured. It is the old law of an "eye for an eye." This notion of punishment was held long before men dreamed of legal procedure. It was the expression of the intent to wreak venge-

[1] Courts do at times recognize that the law is "behind the times" in such matters. McCarty quotes from the opinion of the Iowa Supreme Court on a woman who murdered her husband: "Outrageous and hideous crimes are often committed. Sometimes it is difficult for humanity to understand why sane men will perform these acts. Certain psychologists and medical experts believe that no mentally balanced man can be guilty of such atrocity; yet, in the application of criminal law, it is necessary for courts to adhere closely to human experiences and the consensus of opinion drawn therefrom. Until some more scientific method is devised by legislation, this must be the policy of criminal jurisprudence" (*12*, 404).

[2] "Modern criminal jurisprudence proceeds on the basis of three specific assumptions: that the offender must be punished; that this punishment will somehow reform and redeem him; that it will at the same time deter him and his similars from further frailties. Behind these ideas lurks the fundamental purpose of our legal and penal program, an abstraction generally referred to as the defense of society" (*23*, 30).

ance upon the person who has been guilty, either directly or indirectly, of injuring another. While this notion is not often admitted today, it is, nevertheless, a fundamental way of thinking for many people. In connection with this point, Smith remarks as follows:

> In order to evade admitting a belief in retributive theory of punishment, we are obliged to make "rationalizations," we talk of upholding the majesty of the law, of maintaining the supremacy of society. But even if, as has been suggested, this idea of retaliation is merely a survival of exploded "animistic" doctrines, there is good reason to think that this theory of punishment will have to be reckoned with for many a year to come. . . . Perhaps it may not be desirable that this view of punishment should be entirely overlooked. But there can be no doubt that the effects of this theory have been, and still are, in many ways, evil. To it we owe the determinate, fixed sentence, which still largely obtains, although in some countries matters are now better ordered in this respect. To release an habitual offender at the end of a fixed term, quite irrespective of the effect which his sentence may have produced upon him, can only be justified on this theory of retributive punishment. And the custom of dealing with "petty" offenders by small fines, mingled with occasional short sentences of imprisonment, can only be explained in the same way (*24*, 5).

The Theory of Reformation. Of the three ways of regarding the problem of punishment, that of reformation is perhaps the most recent and, on the whole, the most sensible and humane. The ordinary criminals are to be considered as individuals who, in a way, suffer with a disease—a disease, we might say, of a social nature.[1] They are to be cured. The cure consists in reëquipping them with a new attitude toward society, with a new set of motives and action patterns to sustain them properly in their future social relations. They are to be rehabilitated or rebuilt mentally, glandularly, and behavioristically, to meet society in a socially desirable manner.

Much time and effort have been spent so far in this direction with discouragingly small returns. Perhaps it is partly the method that is at fault. So very little has actually been done to determine the nature of the conditions which lead to the individual's transgression that we cannot hopefully look, at the moment, for larger returns. We must turn to the future and hope that with further study more satisfactory

[1] Wilson makes a very strong point in his discussion of punishment. He believes that the primary object of punishment must be the cure of the individual, while the secondary aim must be the protection of the community. "If the former succeeds, the second follows; whereas if the order be reversed, as now, there will always be failure in both objectives. To protect the community without reforming the culprit is impossible" (*28*, 347).

results will come. We must expect to be forced to learn more about the conditions which lead an individual into a criminal career before we can hope to understand him and to deal effectively with him. What we have to do is to discover why a man acts, or has acted, in a particular manner.[1] This, we know, involves investigation, and to be of any real value this investigation must be of a thorough and searching character. We should expect some reformation in some cases to result from confinement in an institution. Glueck reports from a study of 500 criminal careers, that 68% of the freed delinquents acknowledge benefits of one sort or another from their stay in the penal institution (Reformatory). In a great many cases, however, neither the individual nor society is reformed or improved by such punishment. 32% of Glueck's cases claimed no beneficial results. Of these, 27% said that they had actually obtained a further schooling in crime. In this connection another student comments in the following manner:

> It is an interesting fact that we continue to punish many offences by means of small fines, into which process the idea of reformation cannot possibly enter. It is often said that although punishment may be unpleasant, yet it is necessary that an offender should be punished for the good of society. This argument is really quite beyond the point. If punishment resulted in the good of society, if society were really improved by the punishment of offenders, then this argument would be unanswerable. But this is just the question at issue. Is society any better for the punishment of an offender, or of any number of offenders? The question is really a serious one. For if the individual is not improved by punishment, and if, at the same time, society is not improved, then the sum total is a loss. We are so accustomed to saying that it is necessary to punish, that we often make no inquiries as to the basis of our process or the results which we expect from it (*24*, 6).

Deterrent Theory. This is perhaps the most commonly and widely admitted notion of punishment. The individual who has in some way injured others must be taught a lesson. Moreover, in teaching him, other persons who might be similarly inclined to transgress the rights of society are also restrained. The example of the one who is punished is assumed to be effective with many. The notion is that other individuals are brought to a clearer realization of the penalty exacted of all those who violate the law. The appeal is directly to the *understanding* and *imagination* of those who are criminally inclined. The knowledge

[1] "It means that we must be more preoccupied than we have been with the causes that brought the individual to commit his infraction. In every action, we will find a large part of the explanation as to why the deed was committed in the personality of the individual who did the act."

of the penalty paid by one individual is said to serve as a determining factor in the behavior of others. No doubt, desirable conduct may be conditioned at times in this way. We do recognize that individuals desire to escape pain and suffering. To the extent to which the appeal to fear may be augmented through a knowledge of the dire penalty exacted of the criminal, punishment, even of others, may conceivably act as a deterrent. There are, however, so many other factors involved that some would argue that little perceptible gain of this sort accrues to the punishment of criminals.

It must be recognized that there is a large number of individuals to whom such an appeal cannot be made effective.

> Even a distinct foresight of evil consequences will not restrain when strong passions are at work. How else does it happen that men will get drunk though they *know* drunkenness will entail on them suffering and disgrace, and (as with the poor) even starvation? How else is it that medical students who *know* the disease brought on by dissolute living better than other young men, are just as reckless and even more reckless? How else is it that the London thief who has been at the treadmill a dozen times, will steal again as soon as he is at liberty? . . . If hopes of eternal happiness and terror of eternal damnation fail to make human beings virtuous, it is hardly likely that the commendations and reproofs of the schoolmaster will succeed. There is, in fact, a quite sufficient reason for failure—no less a reason than the impossibility of the task. The expectation that crime may presently be cured whether by State education or the Silent system or the separate system, or any other system, is one of those utopianisms fallen into by people who pride themselves on being practical. Crime is incurable, save by that gradual process of adaptation to the social state which humanity is undergoing (*25*, 171).

There are many who may be afraid yet who cannot possibly resist doing some act. Arnold points out:

> There are many reasons why deterrent punishments should fail in their aim, and that it is only with minds of certain descriptions that they are likely to succeed. That they are unlikely to achieve their object in many cases seems to us certain, namely, in those cases in which the impulses are very violent and pass into actions most rapidly. Here the assumption of those who rely on deterrent punishment is simply that the intellect can restrain the passions, and we have already given ample grounds for holding that it can rarely do this. Now deterrent punishment has this disadvantage that its failure is more disastrous in its results than either of the other two forms: indeed retributive punishment, from one point of view, can hardly be said to be liable to failure. Deterrent punishment from the fact of its severity must have some result: if it misses its aim of prevention, it can only do harm (*2*, 526).

Sexual delinquency, for instance, with its threat of life disgrace is all too well known to need discussion. Under great emotional excitement individuals behave in ways which they may unquestionably regret later.

The world happens to be full of human creatures, we are told, who are constantly in the condition of the normal man under tremendous stress and of others too dull to comprehend their danger—to reckon the consequences of acts. These will not and cannot be deterred by the most terrible penalties. Imprisonment, hanging, electrocution, disembowelment, all the horrors which the diseased imagination of the centuries has been able to devise, have signally failed to restrain such men from criminal courses. Turn again to the histories. Every page makes it clear that fear and terrorism are useless against these (*23*, 274).

The psychologist is greatly interested in the deterrent view of punishment. He sees at work in these cases in which prevention is effective the building up of strong inhibitions against certain forms of criminal behavior as well as the formation of behavior patterns of a positive or socialized sort. That behavior may be restrained through fear is universally accepted. Whether this is the most desirable form of conditioning behavior is questionable. Where it is the only effective means of determining desirable conduct of a social sort, we must accept it. We must not, however, be blinded by the facts. Punishment to deter either the punished or others has limited effects.[1]

MODERN PRACTICES AND THEORIES IN LEGAL REFORM

Present day methods of treating individuals found guilty of crime are strikingly different from the older methods in which prisoners confined in dark dungeons, indescribably filthy with vermin, slowly turned into horrible creatures. But with all such changes in our treatment of criminals the waste in human potentialities is still appalling. It seems that society holds human life, as represented by the average delinquent,

[1] The Committee on Legal Aspects of Psychiatry has reported as follows: "It cannot be seriously denied that fear plays an important rôle in deterring most persons from the commission of legally prohibited acts. It is the contention of psychiatry, however, that the motive of fear is not the only motive of conduct, lawful or unlawful. In accordance with this view, therefore, a rational program for the administration of criminal justice must recognize other means of coping with anti-social conduct than the simple appeal to the fear emotion. As long as the law confined itself to a reliance upon fear as the principal deterrent force, there was not much need of psychiatry. With the increasing recognition of the complex mental factors which enter into the commission or failure to commit a certain act, however, psychiatry and psychiatrists must necessarily be drawn into a rational administration of justice; and this is true not only in those cases in which a definite mental disorder, be it disease or defect, is present, but in the general run of cases."

to be very cheap. Much has been done in the last few decades to improve the physical surroundings of those members of the criminal class of society who are institutionalized. This way, of course, makes the greatest immediate showing. Strikingly little has been done, however, toward dealing adequately with the psychological problems of the delinquent. We wish to refer briefly to ways, some of which are in practice and some of which have been suggested, of dealing more adequately with the criminal. Some of these ways clearly appeal to psychological principles.

Suspended Sentence. Even the most superficial and casual observer recognizes that not infrequently an individual is the rather helpless victim of an unusual set of circumstances which result in his becoming a criminal. Perhaps the conditions are so peculiar that there is little probability of their ever recurring. Where an individual is clearly guilty of his first offense, and where the circumstances of his crime are of the above sort, both society and the individual may profit by suspending sentence, thus permitting the individual to continue in his normal way. In all such cases, the type of crime and the character of the individual must necessarily be carefully considered. Where the crime is clearly due to a permanent *condition* of the individual and not the environment, such procedure would obviously be unwise. It should not be used where the individual shows evidence of permanent instability—in general, where there is any reason to believe the individual will most likely again do harm.

Segregation. One of the regrettable features of confinement, in terms of actual waste of human material, is the usual demoralization of the younger delinquent by his hardened and incurable prison mates. Handicapped as we are in discovering the full extent of such damage, we nevertheless recognize that prisons are too often schools of crime. In them, the novice is actually initiated into many new forms of anti-social conduct. He may enter an institution for some minor infraction of the law and during a short detention learn enough to bring him back for the remainder of his life. Proper segregation of individuals prevents a major share of this loss. Of this point we read:

> One hour's contact with an admired notoriety will shape more evil than ten years of punishment, sermons, tracts and beatings can correct. Prisons as we have them today were planned and built with such facts in view. Accordingly, we had the so-called Pennsylvania or European system of solitary confinement and the Auburn system of single cells—complete segregation at night and free association during the day, under guard and originally in strict silence. Both these prison plans have failed to accomplish their object, failed

so completely that no informed man now questions that jails and prisons are the seminaries and universities of criminality.

Yet segregation is correct in theory, necessary and workable. The trouble in the past has risen out of various factors. Solitary confinement drove men frantic and had to be abandoned. Perpetual silence was almost as bad and futile in the end, because the convicts invariably perfected methods of secret communication, thereby preserving all the evil of gregariousness and none of the good. It, too, has been done away with after generations of stupid brutalities. Again, the prisons have been more or less constantly overcrowded, so that two or more men or women frequently occupied small cells together. Unnatural sexuality, other forms of vice, plotting, and all the other evils which segregation hoped to overcome naturally flourished. Finally, prison officials up to this writing have never had either the knowledge or the facilities for scientific segregation, and here is the deepest fault of all. It is useless to throw all first offenders together, for some are green and pliant boys and others are already as deep-dyed in villainy as the last recidivist. It is equally vain to set men in prisons apart according to age groupings, types of offenses, religion, physical condition or any of the standards usually urged. Nor can any man, unless he is a highly trained and deeply experienced psychiatrical, neurological and psychological specialist, make proper decisions as to the class to which any given convict ought to be assigned. Even such a man needs for the precise performance of his task an equipment nowhere provided at present (*23*, 263)

Indeterminate Sentence. Some students have maintained that a sensible employment of the indeterminate sentence would be an effective method of dealing with criminals. Under the proper administration of this system, an individual found guilty of misconduct grave enough to demand detention would be confined in an institution. Here he would remain subject to observation and study by specialists. He would have no fixed term of *commitment.* He would remain until it was fairly evident that his release would not result in his immediate relapse into anti-social practices. His release would not rest, as it now does in many cases, in the hands of politicians who might connive for selfish purposes to secure his readmittance into society. Neither would his release be in the hands of the judge who sentenced him. His release would depend somewhat upon his conduct in the prison but largely upon the nature of his mentality and his general fitness to maintain himself as a productive member of society at large. As it works today, the indeterminate sentence is, at times, distinctly harmful. There are too many opportunities for freedom where freedom should apparently be denied. And there are too few opportunities for actually determining in a reliable manner whether an individual is truly ready for and deserving of release.

Parole. Along with the proper working of a system of indeterminate sentences there would need go an efficient system of parole. As soon as it were deemed wise to release a delinquent, he would be paroled for an indeterminate period.[1] During this time he would be definitely on his good behavior. He would understand that any serious expression of anti-social conduct must result automatically in his return to detention without the trouble of trial. In this way he would have no way of escaping, in a new trial, through the chances of some miscarriage of justice. Once it were fairly evident that the individual had been able to build up behavior patterns of a sort capable of sustaining him properly in the eyes of society, he would then, but not until then, be finally discharged. Under such a system "the ideal will be to do as much as lies within human power for every imprisoned human being and to set him free as soon as he seems likely to be a safe and useful member of society, thus serving the interest of the individual and the state to the maximum" (*16*, 273).

Permanent Detention. Evidence derived from studies upon criminal "repeaters," or recidivists, clearly indicates the utter futility of hoping for any improvement in many cases. The proverb, "You can't teach an old dog new tricks," seems to hold in many cases of criminal behavior. Thoughtful criminologists have long held that it would be far better for society to commit permanently to some institution the individual who gives unmistakable evidence of a future life of crime. Permanent detention in such cases is at least less costly to society. Such procedure is certainly advisable where a lack of normal mentality is coupled with anti-social behavior. Where proper environmental conditions exist, an individual of this sort is better provided for within some institution. He is in this way protected against himself. He is shielded from temptation.

Juvenile Court. An attempt is being made in many of the larger cities to deal sanely with the youthful criminal. In the juvenile court the delinquent is brought before a judge who is intelligently alert to the peculiar difficulties of his task. In the semi-privacy of his court, the

[1] The essential notion of the parole system as stated a number of years ago in a report of the Prison Association of New York is as follows: "1. That the prisoner ordinarily arrives at a period in his imprisonment when further incarceration will be of less service to him and to the state as a reformative measure than a like period passed in liberty under parole supervision. 2. That in the determination of the proper time at which to admit the prisoner to parole an exhaustive and painstaking study will be made of the individual case, in order that both the right of society to be protected, and the right of the prisoner to rehabilitate himself, may be preserved" (*6*, 47).

delinquent is examined, and recommendations as to treatment are made upon the basis of reports from parents, social workers, and psychologists. It is now recognized that a majority of adult criminals are drawn from among the adolescent violators of the law. Some individuals start criminal careers while quite young, and, in many cases, they never stop. No doubt some adolescent delinquents who are picked up and, upon the recommendation of the court, placed in proper homes where they are provided with adequate food, clothing, and medical treatment, show gratifying changes in behavior. Such changes appear particularly where delinquency is due to the influence of companions or poverty. And it is doubtless true that the few who are "redeemed" in this manner more than justify the whole procedure.

We have reviewed some of the psychological problems and aspects of law. We have considered the judge, the lawyer, the juror, the witness, and the criminal. We have glanced at the nature of crime and the problem of responsibility. In connection with the last, we saw that the psychologist does not view the matter as does the lawyer. The former believes that criminals are deserving of intelligent understanding; the latter holds that, provided they know the difference between right and wrong, criminals must be punished. The psychologist insists that adequate methods of treating with the criminal must be psychological in character. This holds true for the clearly "abnormal criminals" as well as for the more "normal criminals." He maintains that it is impossible to treat adequately with the delinquent without an understanding of his psychological make-up. The court in which he is sentenced and the penal institution to which the criminal goes must be aided by the clinic. In the clinic an understanding of the nature of his intelligence, his emotional equipment, and his possibilities for improvement may be secured. Only where information of this sort is available can a sensible program for criminal treatment be worked out. Of this point, the Committee on the Legal Aspects of Psychiatry again reports that, in its opinion, "only by recognition of the motives behind criminal conduct can the treatment prescribed by the judge be intelligently calculated to protect society and rehabilitate the criminal, if possible, at the same time. Moreover, only through the aid of trained psychiatrists, assisted by psychologists and sociologists, can those forward-looking reforms in the administration of criminal justice, such as probation, the indeterminate sentence, or parole, be effectively administered."

BIBLIOGRAPHY

1. Ames, J., *Lectures on Legal History.* 1913.
2. Arnold, G., *Psychology Applied to Legal Evidence and Other Constructions of Law.* 1913.
3. Brown, M., *Legal Psychology.* 1926.
4. Corbin, H., "The Jury on Trial," *Am. Bar Ass. Jour.*, 1928, *14*, 507.
5. Galton, F., "Terms of Imprisonment," *Nature*, 1895, 174.
6. Glueck, S., and Glueck, E., *500 Criminal Careers.* 1930.
7. Healy, W., *Human Biology and Racial Welfare.* Ed. by E. Cowdry, 1930.
8. Hoag, E., and Williams, E., *Crime, Abnormal Minds and the Law.* 1923.
9. Holmes, O., *Common Law.* 1881.
10. Larsen, J., "The Berkeley Lie Detector," *Am. Bar Ass. Reports*, 1922, *47*, 619.
11. Osborn, A., *The Problem of Proof.* 1922.
12. McCarty, D., *Psychology for the Lawyer.* 1929.
13. McDougall, W., *Outline of Psychology.* 1923.
14. Mercier, C., *Criminal Responsibility.* 1926.
15. Miller, S., "The System of Trial by Jury," *Am. Law Rev.*, 1887, *21*, 859.
16. Moore, T., *Dynamic Psychology.* 1926.
17. Münsterberg, H., *Psychology, General and Applied.* 1914.
18. ————, *Psychology and Social Sanity.* 1914.
19. Muscio, B., "The Influence of the Form of Question," *Brit. Jour. of Psych.*, 1916, *8*, 351.
20. Pollock, F., *First Book of Jurisprudence, 3rd Ed.* 1911.
21. Ploscowe, M., "Modern Tendencies in Criminal Law," *Jour. of Crim. Law and Criminology*, 1930, *21*, 26.
22. Rosanoff, A., *Manual of Psychiatry.* 1920.
23. Schlapp, M., and Smith, E., *The New Criminology.* 1928.
24. Smith, M., *The Psychology of the Criminal.* 1922.
25. Spencer, H., *Social Statics.* 1866.
26. Sutherland, E., *Criminology.* 1924.
27. Swift, E., *Psychology and the Day's Work.* 1918.
28. Wilson, A., *Unfinished Man.*

PART IV

Problems of Abnormal Psychology

CHAPTER XIV

NATURE, CAUSES, AND SIGNIFICANCE OF MENTAL DISEASES

A history of man's treatment of persons of abnormal mentality reveals such elements as horrible brutality, gross superstition, incredible ignorance, reverence, awe, and fear mixed together in an amazing manner. Where mental disease has been viewed as the blessing of God, respect and awe mark the attitude of man; where it has been held as the sign of the "evil presence," fear, torture, neglect, and avoidance have characterized man's behavior toward the mentally afflicted. Among our more ignorant contemporaries, one may still find anything but pity and sympathetic understanding of persons afflicted with most forms of mental disease. The average man is as yet too ignorant, too permeated with magical and animistic notions of the causes of psychological behavior, to view intelligently many of the subtler forms of mental disorders. He requires the spectacular to evoke understanding. Where there is great bodily activity, screaming, and shouting in the mentally disturbed, he may dimly appreciate that something is surely amiss. Where the signs are more subtle, however, his understanding suffers. We wish in this chapter to discuss briefly the general nature of psychological disorders (generally known as insanity), their causes, and their significance in the hope that a fuller knowledge of such matters will lead to greater understanding of the close kinship we hold with the "occupants of the madhouse." It is hoped that a proper realization of the nature of this kinship will remove those attitudes of the disgust and horror with which so many view the mentally diseased. Understanding demands that we regard the psychologically diseased as being no more horrible than the physically diseased. Both are the expression of biological forces. The one is certainly no "worse" than the other; neither is bad.

NATURE OF MENTAL DISORDERS

Who is mentally normal? This question is probably as difficult to answer as the question raised long ago by Pilate concerning the nature of truth. Yet we constantly hear individuals speaking easily of the

normal and the abnormal individuals. What do they mean? In general, we assume that they think of a normal person as one who stands at or quite near the central tendency in a typical group of individuals. The normal person represents the average. An abnormal individual, then, is one who deviates from the average. This is the sense, at least, in which the psychologist uses the terms normal and abnormal. He does not employ the term abnormal to mean that someone is offensively peculiar; or in a manner disparaging to an individual. To him normality and abnormality are "statistical concepts." The norm is a computed value. It is an expression of the "*most.*" Abnormality in turn represents a deviation from the norm. It means that the mentally abnormal person is not mentally like the average person of a given group.

The psychologist recognizes that there are many degrees of abnormality or deviation from the norm. He assumes that a person may be normal mentally in some respects, and at the same time abnormal in others.[1] He may be abnormal emotionally and normal intellectually, or *vice versa.* The person who hates too much or too little; he who fears nothing or everything; the man who rides a hobby too hard or is not interested in anything—all such persons and many more are regarded as being mentally abnormal. The abnormal person may talk too much, or he does not talk enough; he wishes to pray too frequently, or too long; he wears too many, or too few clothes; and so on. It is always a matter of too much or too little. A poet has expressed the same idea in the following lines:

The miser who hoards up his earnings,
  The spendthrift who wastes them too soon,
The scholar grown blind in his delving,
  The lover who stares at the moon . . .
Whoever is downcast or solemn,
  Whoever is gleeful and glad,
Are only the dupes of delusions—
  We are all of us—all of us mad.

[1] "The sort of material which is before us when we try to frame a general conception of mental disorders . . . is a motley group. It includes respectable bankers peevish with their wives; scrupulous housewives with immaculate and uncomfortable homes; children with night-terrors and all sorts of wayward reactions; earnest reformers, intellectuals, aesthetes; delicate and refined invalids, evasive and tyrannical, with manifold symptoms and transitory dramatic episodes; patients delirious with fever, or reduced by a great variety of organic diseases; patients frozen with melancholy or indulging in an orgy of exuberant activity; patients living in a fantastic world with morbid visions and communications and uncanny influences, in whose universe one sees no coherence or logical structure; patients keenly logical and argumentative, embittered, and seeing around them a hostile world with which they refuse to compromise" (*3*, 25).

At all times during the following discussion of psychological abnormalities, we shall keep before us this quantitative point of view concerning the nature of normal and abnormal individuals. We shall recognize that *individually* considered, a person cannot be said to be either normal or abnormal. But when his behavior is widely viewed in terms of the behavior of others, he may then be said to be like or different from others—he is either normal or abnormal.

We wish to make perfectly clear that in a great many cases the line between the normal and the abnormal is difficult or impossible to draw. This does not hold, of course, for the extreme forms of mental diseases. The person who tears his hair, screams, slashes at himself and others, runs heedlessly in the path of moving cars, refuses to eat and drink is clearly abnormal. He is strikingly different from the normal person. But in a large number of cases the mentally abnormal person is not so strikingly different from others; he is one who merely varies a bit from others, perhaps in one respect.

It may be that a change in the times may cause a man to be regarded as abnormal. Years ago, for instance, men went barefoot and in sack cloth about the country, and spent long hours in prayer. Today a man who went so apparelled, who stopped to pray on street corners, or who stopped busy persons and sought to convert them would most likely be sent to a psychopathic ward for purposes of observation. Behavior which formerly was perfectly normal has now become distinctly abnormal. We shall find occasion from time to time during the following discussion to refer to the close relationship between the normal and abnormal.

CLASSES OF MENTAL DISEASES

Minor and Major Diseases. A mental disease may be of a minor or of a major sort. We know that many persons are mentally disturbed at times through gnawing worry, strong fear, unusual distress, consuming desire, or persistent urge, although they are able to continue their daily affairs. There are persons who become ill each time they see certain objects. Others are afraid to venture near the edge of a cliff. They become pale; they tremble; they may even lose consciousness. When they are removed from the presence of the fearful situation, they again behave in a normal manner. Such conditions represent minor forms of mental disease. They are abnormal but not clearly so. But many other persons are wholly unable to proceed at any time with the affairs of their daily lives. They no longer recognize their friends; they cannot work; they may refuse to wear clothing even in low temperatures; they

may murderously attack all within reach. Their disease, we say, is of the major sort. They are most certainly abnormal.

Functional Diseases. A mental disorder may be purely *functional*; that is to say, purely psychological in character. We recognize, for instance, that a "normal" individual may sit deeply engrossed in some story and fail to hear his friends walking about him or speaking his name. His inability to hear in such cases is merely functional. There is nothing structurally wrong with his ears or his nerves or his brain. His friends, of course, consider it a case of deep attention—not mental disease. But again he may be unable to hear for weeks or months even though a careful neurological examination indicates that there is no disturbance of his ears, his nerves, or his brain. Now he is said to be functionally diseased or disturbed. A great many cases of this, or of a like nature, exist in the population at large. A large number, added by the war, pass under the name of war neuroses ("shell shock"). In all such cases, we have clearly illustrated types of mental *disease;* but not forms of insanity, if we may use the latter term at all.

The idea of insanity is not at all parallel to the idea of mental diseases. A man may have general paresis, which is one of the most common of the mental diseases, and yet not be "insane." By indisputable medical criteria he may be a victim of this disease, yet legally he may not be at all sick, since he may have no noticeable defect of judgment or disorder of conduct. Similarly with dementia praecox, manic-depressive insanity and paranoia—there may be years of the mental disease but no insanity in that the patient can pass muster as a sane man by the legal standards. Though in the case of the above mentioned diseases the majority of patients finally reach the status of insanity, there are other mental diseases where the great majority of patients and their physicians would fiercely resent the idea of mental disease at all and where insanity is only occasionally declared to exist. These diseases are known medically as the functional neuroses: neurasthenia, psychasthenia, and hysteria; and yet nothing is so purely mental as the fixed ideas, the fears, the paralyses, impulsions, and anaesthesiae of these conditions. Because we associate the term mental diseases with insanity we are loath to call things by their right names, and so fall into vicious mental habits" (*21*, 15).

Insanity is not strictly a psychological term; it really belongs to sociological and legal terminologies. An individual who cannot maintain his social status because of mental disease is assumed by the sociologist to be insane. Or an individual who does not know the difference between right and wrong is regarded by the law as insane. On the whole, it is better not to use the term at all except in the sense of social or legal inadequacy.

Organic Diseases. A mental disease may be *organic* in nature. It may be caused by a number of physical conditions. An individual through head injury or infection may lose a portion of his brain. Or his brain may gradually soften in "old age." Again, he may suffer great glandular disturbances. Or alcohol may act harmfully upon delicate neural structures. In all these cases, resultant mental disturbances are said to be *organic.* The distinction here is evidently not psychological. The functional forms of mental disease cannot be distinguished from the organic forms in terms of observation. The differences between them are not behavioral. Such differences cannot even be put in terms of degree—more or less—of behavior. The differences lie rather in their interpretation—in terms of the assumed conditions (causes) of such disordered behavior. In the functional sort there is no ascertainable neural (bodily) disturbance to account for the behavior. In the organic, however, there are discoverable changes in the nervous system (body) to which the behavioral disturbances are referred.

The Symptoms of Mental Diseases. We find that a mental disease may involve one or more of the psychological functions. There are, for example, disturbances of perception clearly marked either by a loss or by an increase in sensitivity. Actions, too, may be greatly disturbed. Individuals keep moving constantly day after day, or remain helpless through paralysis of the bodily members. There may be disturbances in memory. Individuals are unable to recall the events of a whole lifetime, or they can recall only certain events. The imagination, too, may be greatly disturbed. The individual, for instance, may exhibit intense fear aroused under a very vivid play of the imagination. Emotional disturbances are very common. Sometimes we find great excitement; at other times, complete loss of emotional life. Reason, too, may be partially or wholly impaired. The individual may experience delusions in which he believes himself to be a king, and, as far as possible, behaves in a kingly manner. All such manifestations are known as *symptoms.*

The symptoms of mental diseases are manifold. They are not, of course, the disease itself but merely the expression of the disease, in the same way that fever, as a symptom, is the expression of certain physical diseases. Each symptom of mental disease is assumed to have a definite cause—it does not happen by chance. The task of the psychologist is to recognize the symptoms and to interpret them according to their true nature (meaning). He must know what they "represent"; that is, the nature of fundamental condition of which they are merely the expression. Here is the difficulty of dealing with mental diseases. It is the difficulty of correct interpretation. When we have properly

interpreted the symptoms, we have *diagnosed* the disease. We then understand the patient. We can treat with him. Sometimes we cannot understand the patient. We are at a loss as to the best way to proceed. The nature of the trouble is not clear. The disease is strange and baffling; that is, the symptoms are unfamiliar.

Some symptoms of mental diseases are hallucination, anaesthesia, delusion, stereotypy, somnambulism, amnesia, paralysis, great bodily activity, indifference, boisterousness, and automatic writing. It should be understood that each of these symptomatic phenomena may occur in persons who are accepted as being perfectly normal. In the individual who is abnormal, however, such behavior is merely exaggerated. In this connection Hart remarks that "even the most bizarre symptoms are not so very different from processes to be discovered in our own minds, and that the lunatic appears more and more like ourselves the better we are enabled to penetrate into the tortuous recesses of his spirit" (p. 40).

SOME WAYS OF REGARDING THE CAUSES OF MENTAL DISEASES

Judging in terms of the various conditions which have been cited in the past as causes of mental diseases, it is indeed surprising that anyone succeeds in getting through life without being adjudged insane. The New York State Commission in Lunacy in its annual report (1897) gave the results of an analysis of more than 27,000 cases in terms of their alleged causes. Among the many "causes" cited there, we give the following together with the number of cases assigned to each. It seems unnecessary to remark that some of these alleged "causes" are, in reality, purely superstitious.

Drink	4,763
Heredity	2,095
Old age	1,723
Ill health	1,681
Masturbation	1,063
La grippe	442
Shock	167
Fever	147
Pregnancy	109

Early Views. History reveals that modern man has traveled far in his thinking upon the problems of causation in mental diseases. Very early, man's insanity was either a gift of the gods or a curse of the Devil. Gods or demons were generally assumed either to enter man's body and cause him to behave in strange ways, or to endow the individual in such a way that he had unusual powers. If he were violent and destructive, it was the work of the devil; if he were slow moving

and harmless, the presence of a benign spirit was accepted. The Jews, for instance, beheld King Saul in his periods of terrible fury as the victim of a malignant spirit. Joan of Arc was seen by some as one peculiarly endowed by the gods and by others as a creature possessed of the Devil and deserving of the most horrible form of punishment—death at the stake. Demonological notions were no worse, however, than the notion of sin as a causative agent of mental disease. According to this notion, persons who were guilty of sinful action against the gods might be punished by being made insane. Nebuchadnezzar, it is said, was seen by some of his contemporaries as the victim of the wrath of an outraged god.

"Witches." For century after century little or no concerted attempt was made to understand the mentally diseased and to treat intelligently with them. It is true that for a time the Greeks and the Romans got away from the more barbarous notions of psychological diseases. From the seventh to the eighteenth century, however, ignorance and superstition were the major attitudes shown toward the mentally diseased. These attitudes were most clearly shown in the treatment accorded "witches." One of the blackest stains on the record of man's treatment of the abnormal is unquestionably concerned with his brutal treatment of "witches." Both in Europe and in America, thousands of persons were burned, stoned, drowned, or otherwise put to death for witchcraft, when, in fact, their only fault lay in their eccentricity, in their poverty, or in their mental incapacity. Of the treatment of these unfortunate persons, we read:

> At Toulouse, the seat of the Inquisition, four hundred persons perished for sorcery at a single execution, and fifty at Douay in a single year. Remy, a judge of Nancy, put to death eight hundred witches in sixteen years. The executions which took place at Paris were, in the words of an old writer, "almost infinite." In Flanders, the persecution of witches raged throughout the whole of the sixteenth and the greater part of the seventeenth century, and every variety of torture was employed in detecting the criminals. In Italy, a thousand persons were executed in a single year in the province of Como; and in other parts of the country the severity of the Inquisitors at last created an absolute rebellion. The same scenes were enacted in the wild valleys of Switzerland and of Savoy. In Geneva, which was then ruled by a bishop, five hundred alleged witches were executed in three months (*31*, 12).

Cruel Treatment of the Insane. When not actually tortured or put to death, the mentally diseased for ages were objects of derision and brutality. Hogarth has given us never-to-be-forgotten pictures of the horrible conditions when "men covered with filth cowered in cells

of stone, cold, damp, without air or light, and furnished with a straw bed that was rarely renewed, and which soon became infectious—frightful dens where we should scruple to lodge the vilest animals. The insane thrown into these receptacles were at the mercy of their attendants, and these attendants were convicts from prison. The unhappy patients were loaded with chains and bound like galley slaves." Watts writes of the celebrated lunatic, Norris, who "was seen by many members of Parliament at Bethlehem Hospital, in London—where he languished in all for eighteen years—with a collar of iron on his neck, a belt of iron about his body, and fetters of iron on his hands and feet" (*30*, 13). Tennyson, too, has given us an account in *Rizpah* of the brutal practices of those earlier years. A mother had come for the last time to visit her boy before he went to the gallows for robbing the mail. The last moment had arrived.

> . . . the jailer forced me away. I had bid him my last good-bye;
> They had fasten'd the door of his cell. "O mother!" I heard him cry.
> I couldn't get back tho' I tried, he had something further to say,
> And now I never shall know it. The jailer forced me away.
>
> Then since I could n't but hear that cry of my boy that was dead.
> They seized me and shut me up; they fasten'd me down on my bed.
> "Mother, O mother!"—he call'd in the dark to me year after year—
> They beat me for that, they beat me—you know that I could n't but hear;
> And then at the last they found I had grown so stupid and still
> They let me abroad again—but the creatures had worked their will.

Modern Conceptions of Mental Diseases. Today we hold to a more scientific conception of mental diseases. This conception is no longer animistic; it is instead deterministic. It rests upon the principle of strict causation. Diseases are due, according to some, to physiological; or, according to others, to psychological antecedents. Of these two positions Hart, who holds to the latter view, writes:

> The physiological conception admits that the phenomena of insanity are phenomena of consciousness, but it assumes that the mental processes are accompanied by corresponding changes in the brain, and to these brain changes it devotes all its attention. With the phenomena as facts of consciousness it has no immediate concern. The first aim of the physiological conception is to find the actual changes in the brain which occur in insanity and the brain changes correlated with each morbid mental process. Its ultimate aim is the discovery of convenient "laws" which will describe these brain processes in the shortest and most comprehensive manner. These laws will, of course, contain nothing but physiological terms—terms of *consciousness* will find

no place therein. The psychological conception, on the other hand, takes from the outset an altogether different route. It regards the conscious processes occurring in insanity as the actual phenomena with which it is called upon to deal. Its ultimate aim is the discovery of convenient "laws" which will shortly and comprehensively describe these *conscious processes*. In this case the laws will contain nothing but psychological terms—terms of *brain* will find no place therein (*12*, 17).

Some maintain that for every mental disease, there is a disturbed or disordered *bodily* condition. They hold to a strictly materialistic point of view.[1] It is recognized, of course, that this is purely an assumption. There are, of course, some mental diseases in which definite organic conditions are found. In senile dementia, for instance, softening of the brain appears. In paresis, gross structural changes occur in the cortical areas. But in many cases, no such basis can be found. Such diseases are functional. They are, we say, purely psychological. A discussion of them, as Hart makes clear, does not necessarily involve any reference to the nervous system. On the whole, it seems much better to us not to attempt the impossible task of separating the mind from the body. It must be recognized that, strictly speaking, it is neither the *body* nor the *mind* that is diseased. It is an individual—a total personality. We must, as we have remarked previously, consider the psychological organism as a unit. We are not concerned with a mindless person; nor are we interested in a bodiless individual. When we come a bit later to our descriptive and explanatory tasks, we shall proceed from the above point of view; *viz.*, that the individual is a personality, and it is the personality changes which constitute the true *symptoms* of psychological diseases.

Predisposing and Exciting Conditions. A quite common classification of the causes of mental diseases includes two sorts: the predisposing

[1] It is difficult to reconcile this position with the current practices in the field. For instance, Glueck writes as follows: "Those who still believe in an exclusively materialistic theory of mental disorder must find it extremely difficult to maintain their doctrine in the face of the many incontrovertible facts brought to light through modern research in the field of psychopathology.

"The modern trend in psychiatry is distinctly in the opposite direction. We no longer today insist upon material changes in cells and tissues for every psychotic phenomenon, but rather endeavor to investigate mental life, be it normal or abnormal, from the biologic point of view. We are being constantly confronted with the undeniable fact that whatever may be the physical substratum of mental disorder, it does not aid us in understanding the peculiar expression which a given psychosis chooses to assume. Why it is that one paretic greets us with the exalted mien of his grandiose delirium, while another spreads about him the gloom of a depressive delirium—the changes in the pyramidal cells do not explain. There must be, then, factors other than material ones which determine this" (*10*, 66).

and the exciting. The former is more often intra-organic; the latter may be either intra-organic or extra-organic. Predisposing conditions are those which incline an individual toward mental disease—toward a breakdown in function. They are the conditions which prepare the individual for the disturbance that comes when the exciting conditions are presented. The latter conditions are those which serve as the "last straw." They are the conditions which are considered by the average person as the "real" causes, although they are not sufficient of themselves to disturb the individual. In general, we say that there is always a certain degree of preparation for mental disease. Without this preparation the individual continues his usual course. But there is also a final insult which he cannot endure. Given a certain type of predisposition and a crisis or a severe reversal of fortunes—love, social, financial—and the individual succumbs. Under the head of predisposition we put such large groups of factors as heredity, alcohol, syphilis, age,[1] physiological epochs, sex, climate. Under the exciting conditions of mental disease we put such general conditions as bodily injury, pathogenic diseases, great exhaustion, endocrine failures, toxic states, emotional shocks, conflict.

Hereditary and Environmental Conceptions of Mental Diseases. A final scientific way of approaching the problem of causes of psychological diseases is the hereditary and the environmental. A great many psychologists and psychiatrists find the source of mental disease either in hereditary conditions or in the events which constitute the *personal* past of an individual, or in both. They maintain, for instance, that some event (emotional shock, insult) of early childhood may even delay until the years of maturity are reached and then operate to disturb the individual. We recognize the great significance of this way of regarding the cause of mental disease.

The environmental approach is particularly the Freudian way. It assumes that some causes are exciting, and some are predisposing. It also grants that some psychological diseases are definitely organic in foundation, although it maintains that the particular direction which a mental disease takes—that is, the particular delusions, hallucinations,

[1] The passing of years apparently exercises some influence in determining susceptibility to mental disease. Very few children suffer from mental disorders. With increased age, however, tendency toward mental disease, as shown by the number of institutional admissions, increases. Moreover, each life "period" seems to bring its own type of disease. Dementia praecox usually comes before the age of 35; general paralysis before 45; senile dementia after 60. Table XXVII shows the number and per cent of first admissions to state hospitals of New York in terms of ages for the years of 1914 and 1924.

TABLE XXVII

Age	1914		1924	
	Number	Per Cent	Number	Per Cent
Under 15 years	14	0.2	44	0.6
15 to 19 years	362	5.8	328	4.7
20 to 24 years	646	10.3	557	8.0
25 to 29 years	708	11.3	696	10.0
30 to 34 years	707	11.3	721	10.4
35 to 39 years	731	11.7	819	11.8
40 to 44 years	629	10.0	698	10.1
45 to 49 years	573	9.1	591	8.5
50 to 54 years	496	7.9	573	8.3
55 to 59 years	350	5.6	437	6.3
60 to 64 years	305	4.9	386	5.6
65 to 69 years	240	3.8	380	5.5
70 years and over	478	7.6	682	9.8
Unascertained	26	0.4	21	0.3
Total	6,265	100.0	6,933	100.0

objects of attack, *etc.*—is determined by the environment of a person. Many individuals regard the environmental conditions as being most significant. Probably all would agree that both are necessary. Of the hereditary and environmental conditions Myerson writes:

> We find that major diseases arise on the one hand from great environmental situations, and, on the other hand, from causes unknown, but which for the present we link up with the indefinite terms "heredity," "inborn temperament," "innate constitution." The environmental causes bring us face to face with age-old problems—alcohol, venereal disease, infection, stress and strain of life and poverty; problems which are only in part medical, which are entangled with social customs, diet, marriage, and the warp and woof of organized human life (*22*, 55).

It has long been contended that heredity plays a very major part in determining mental diseases. Within recent years, however, certain outstanding students have seen fit to question seriously the emphasis laid upon this factor. A great deal of what heretofore has been regarded as constitutional, that is, hereditary, is now regarded by the psychoanalysts as quite possibly individual and due to causes which at least are preventable. The presence of unconscious complexes causes reactions which seem to be constitutional only because their real causes are buried from sight (*33*, *32*).[1] Some claim that manic-depressive psychosis and

[1] In another place this same author remarks, ". . . It is true that many students of heredity believe that all sorts of mental qualities may be traced directly from the

dementia praecox are hereditarily determined, but the evidence is far from being conclusive. On the whole, it is much better to assume that in some cases mental disease may be properly attributed to heredity; and in other cases, to conflict and emotional shocks. Of the significance of the mental conditions (*e.g.*, emotional shock and conflict) in producing a diseased state of the organism, White writes as follows:

> Any severe mental stress may act as an exciting cause. A sudden emotional shock, such as fright, or the horror resulting from the terrible sights of the wounded and dying in a railroad wreck, may induce an outbreak of mental disorder, while the less acute conditions of worry and anxiety, usually acting over a considerable period of time, may also be etiological factors in the development of psychosis. The whole subject of mental causes has received a great deal of attention of late and has constituted a sort of reaction from the pathologist's viewpoint. Reference to the discussion of mind as an adaptive mechanism will make it clear how failure on the part of the individual to get into harmonious adjustment with his environment may produce a psychosis.
>
> Aside from such obvious mental factors as psychological traumata and worry over patently disturbing situations the more remote and subtly acting intrapsychic conflicts are of greater importance. Tendencies for which the individual has never been able to find a comfortable adjustment, desires which he has always had to keep strongly repressed may finally assert themselves as the result of the gradual failure of repression (in advancing age), or its more sudden failure as a result of a mental shock or an acute illness. Under these circumstances the repressed material breaks through and constitutes the symptoms of the psychosis (*33*, 40).

Glueck remarks upon the effect of the emotional shock of imprisonment upon the individual: "Imprisonment furnishes us with a great variety of mental disorders, the origin of which can be traced in a more or less direct manner to the emotional shock and influence upon the psyche which it brings about" (*10*, 3). We wish to discuss briefly this matter of conflict.

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ancestors. Those physicians, however, who deal with the problems of mental illness see, on the contrary, these peculiarities passed on because, as a part of the child's environment, they are impressed upon it during its developmental period. This view has been emphasized because it has been found possible to largely modify so many personal mental traits. Heredity as an explanation is therefore looked upon somewhat askance because it serves to block efforts at improvement. If a certain trait is hereditary, why! that's the end of it. There is nothing to be done. So frequently, however, something can be done that this explanation is being more and more put aside as inadequate" (*34*).

PSYCHOLOGICAL CAUSES AND MECHANISMS OF MENTAL DISEASES

Conflict. Conflict constitutes one of the most outstanding psychological causes of mental diseases. It probably outranks all other causes in terms of the actual number of individuals disturbed. It presumably plays a part even in those diseases in which there is certain evidence of an organic basis. We recognize, in these cases, that some persons may suffer an infectious disease, or a severe depletion of energy without *breaking down mentally.* Others, however, succumb. It is not at all unlikely that in many of these cases the breakdown is to be referred to a conflictory state of the organism. There is, for instance, apparently more likelihood of illegitimate childbirth giving rise to mental disorders than is true of a normal childbirth. In the former, there is usually a much greater degree of conflict. Whenever strong desires, moral and ethical standards, and traditions conflict, we find the possibilities of mental disease. Mental health and the integrity of the personality appear to depend to a major degree upon the nature of the resolution of the conflict. We wish to dwell, for a moment, upon some pathological results of conflict.

It should be pointed out that not all conflict leads to disease. If it did, we should find "normality" constituting the exception, and disease constituting the rule. Very few persons get through life without experiencing considerable worry and no small amount of fear because of the consequences of some act. In most of these cases, no serious after-effects are discernible. We know that many individuals settle conflicts by rule. There is only one thing to do in a particular case, and it is done. The rule may actually prevent the rise of serious conflict. One simply does not tolerate an alternative. "Happy is the person," we are told, "who has his rules of life laid out for him." He may be narrow and unprogressive, but he can usually forge ahead untroubled by conflicts. Persons may again settle conflicts by intelligently facing the problems and permitting the strongest associations and desires to override the weaker.

Where conflicts are severe, and the history of the person has not been of the sort to settle them properly, mental disease may ensue. A great many mental cases are, no doubt, directly attributed to conflict. White gives the following brief picture of the way in which this mechanism may work:

A young woman disappointed in love is compensated by a life devoted to the service of others, or perhaps if the conflict is too severe she may develop a wish-fulfilling delirium and thus by a vicarious psychosis cause all her desires to be realized, or if the conflict reaches deeper she may deteriorate and develop

delusions which express compensations more or less adequate in proportion to the degree of so-called dementia or of mental disintegration. . . . A psychosis is the resultant, the issue for the time being, of a conflict. The conflict is between unsatisfied, instinctive desires which have been repressed into the region of the unconscious, and the conscious, voluntarily directed tendencies of the individual (*33*, 17, 20).

In order to discover the actual source of mental diseases, it is always necessary to go beyond the observable symptoms to the nature of the conflict which lies behind. The task of understanding abnormal phenomena consists essentially in uncovering the conditions of the earlier conflict. Until this is done, we must remain largely ignorant of the true cause of many of the mental diseases.

Repression. We wish now to trace in more detail the mechanisms by means of which conflict may result in disorder. We discover first of all that conflict may result in *repression* of a very strong desire or wish. A desire may not only be denied gratification, but it may be deliberately thrust aside so that the individual is no longer emotionally torn by the indecision of conflict. Before, he hesitated and swung uncomfortably between two opposing desires, or between possible goals of achievement. Now he has only one desire. Before, he pictured in phantasy the indescribable delight attendant upon the full gratification of an abiding desire from the satisfaction of which he is held back by the stern realization that he must stand by his obligations to family and society. Now, however, he has only his family and society or the world of reality. The other has been vanquished. It is repressed into the subconscious. Again, it may be that an individual has a very unpleasant experience in his earlier years. He may have witnessed some horrifying scene. He may have been the indirect cause of some friend's death. The memory of this earlier event is always attended by distress. He seeks to rid himself of it; he "forgets" it—that is, he represses it. Or rather, it is repressed for him. But it is not destroyed. It remains, and like a concealed infection, it may manifest or express itself in strange ways. These ways constitute some of the *true symptoms* of mental disease.

As an illustration of what may happen under the expression of some repressed experience, let us consider the case of Elizabeth.[1]

Elizabeth was engaged in nursing her sick father who afterwards died. One evening, spent away from home at the solicitation of the family, she met a young man of whom she was very fond and he accompanied her back home. On the walk home she quite gave herself up to the happiness of the occasion

[1] Due credit in this case must be given to Freud as well as to White.

and walked along oblivious of her duties. On reaching home she found her father much worse and bitterly reproached herself for forgetting him in her own pleasure. She immediately repressed this disagreeable thought from her consciousness. Now she had, each morning, to change the dressings on her father's swollen leg. To do this she took his leg upon her right thigh. The suppressed complex seized upon the feeling of weight and pain of her father's leg upon her thigh as a handy and efficient means of expression and so the repressed erotic wish comes into consciousness under the disguise of a painful area of the right thigh corresponding in extent and location to the place upon which she rested her father's leg (*33*, 91).

Somnambulism. The indirect expression of some distressing experience may take the form of *somnambulism.* Here the earlier experience temporarily determines the activities of the individual. The individual, we say, is awake; yet he is surely not normal. He may be completely cut off from his physical environment and behave in accordance with the dictates of some former experience. In *Macbeth,* Shakespeare pictures very dramatically a case of somnambulism.

Enter Lady Macbeth, *with a taper*

Lo you, here she comes! This is her very guise; and, upon my life, fast asleep! Observe her; stand close.

Doctor. How came she by that light?

Gentlewoman. Why, it stood by her; she has light by her continually, 't is her command.

Doctor. You see, her eyes are open.

Gentlewoman. Ay, but their sense is shut.

Doctor. What is it she does now? Look, how she rubs her hands.

Gentlewoman. It is an accustomed action with her, to seem thus washing her hands; I have known her continue in this a quarter of an hour.

Lady Macbeth. Yet here 's a spot.

Doctor. Hark! she speaks; I will set down what comes from her, to satisfy my remembrance the more strongly.

Lady Macbeth. Out, damned spot! out, I say!—One, two; why, then 't is time to do 't.—Hell is murky!—Fie, my lord, fie! a soldier, and afeard? What need we fear who knows it, when none can call our power to account?—Yet who would have thought the old man to have had so much blood in him?

Doctor. Do you mark that?

Lady Macbeth. The thane of Fife had a wife; where is she now?—What, will these hands ne'er be clean?—Nor more o' that, my lord, no more o' that; you mar all with this starting.

Doctor. Go to, go to; you have known what you should not.

Gentlewoman. She has spoke what she should not, I am sure of that; heaven knows what she has known.

Lady Macbeth. Here 's the smell of the blood still; all the perfumes of Arabia will not sweeten this little hand. Oh, oh, oh!

Doctor. What a sigh is there! The heart is sorely charged.

Gentlewoman. I would not have such a heart in my bosom for the dignity of the whole body.

Doctor. Well, well, well—

Gentlewoman. Pray God it be, sir.

Doctor. This disease is beyond my practice; yet I have known those which have walked in their sleep who have died holily in their beds.

Lady Macbeth. Wash your hands, put on your nightgown; look not so pale.—I tell you yet again, Banquo's buried; he cannot come out his grave.

Doctor. Even so?

Lady Macbeth. To bed, to bed! there 's knocking at the gate; come, come, come, come, give me your hand. What 's done cannot be undone. To bed, to bed, to bed! (*Exit.*)

Complexes. The experiences which are repressed into the subconscious constitute *complexes*. These complexes serve, as we have just seen, to determine behavior. They incline the individual in one direction rather than in another. In the normal individual they may unconsciously color his moral notions, influence generally his attitude toward the world, and modify his beliefs and prejudices. Exaggerated and expressed, they produce abnormal behavior symptoms. Noyes writes of the case of a man whose numerous and bitter prejudices were frequent subjects of comment by his acquaintances. Later he developed a mental disease and died in an institution for the insane. "Ill health had relaxed the repression of those numerous tendencies the expression of which the prejudices were designed to prevent and a psychosis followed. The effort to solve the conflict had ended in failure" (*23*, 29). Complexes may manifest themselves normally by blushing, by stammering, by emotional disturbances without any knowledge of the cause, by slips of speech, by momentary loss of memory of some person or event, by attempting to carry out some bit of "senseless" action such as trying to use one's office key to unlock the door of one's home, by unknowingly addressing a friend by the name of another, and so on. Each of these as well as thousands of similar forms of behavior are assumed to symbolize certain repressed tendencies. They are overt expressions of the hidden, unconscious forces which thus operate at all times to determine human behavior.

Rationalization. Behavior which is determined through repression—that is, which is grounded in a complex—may be cleverly "explained" by an individual. But the various reasons advanced in this way may

not be the real reasons at all. This finding (offering) of reasons which serve to satisfy the individual without his becoming aware of the true nature of his desires and purposes is known as *rationalization.* When unduly exaggerated, repression supplies the delusory symptoms of the abnormal person. For instance, if such an individual is asked why he is in the institution for the mentally diseased, he may find any number of perfectly "good" reasons. It may be that he is a great man, and his political enemies have placed him here to get rid of him. It may be that his wife desires to remarry and has set him aside here. He cannot give the true reason. The bald truth would make life unbearable for him. The mechanism of repression and forgetting sees to it that he does not recall, and in this way he is permitted to endure matters. This mechanism is essentially one of blinding the individual to the true facts in the case. He must have reasons in order to satisfy his intellect and to justify his conduct. Rationalization provides the required reasons.

Flight into Reality. A complex may express itself by producing a greatly heightened form of behavior. When one wishes to forget something, one way of escape is to plunge feverishly into some line of work that requires full and undivided attention. One may, as we know, drown trouble in hard work. One may whistle up courage; that is, one may forget some fear if one whistles loudly. In many cases of mental disease, we find the patient exhibiting great activity. He rushes here and there, waves his arms about, talks a great deal—in short, he gives the distinct impression of one who is trying to run away from himself and some situation. This has been called a *flight into reality*—a flight which has as its aim an escape from truth. It is an escape mechanism.[1]

Compensation. A complex frequently expresses itself through *compensation.* A normal individual who is small in stature may unconsciously swagger and talk much in order to cover his felt inadequacies. Not infrequently the most brazen front covers the tenderest hide. The individual puts on an air of indifference or boldness in order to make his life bearable. Some of the kindest persons are the gruffest. They hide behind a rough exterior. There are some who see in terms of compensation a close relation between the genius, the degenerate, and the mentally diseased. The genius is one who over-compensates and thus attains greatness. The degenerate is one who may try to compensate for some complex (inferiority), but who finally succumbs to his inferiority. He gives up and becomes the drifter and the ne'er-do-well. The mentally deranged are those who escape from a true realization of their short-

[1] See White (*33*, p. 137)

comings and inadequacies by a flight from reality. They create in phantasy a dream world in which they possess that which, in reality, they lack.

Symbolism, too, is an interesting mechanism. We say that repressed experiences tend to express themselves by appearing in disguise—not in their real form. The individual behaves in a certain way, although he does not know why. His behavior is symbolic; the true nature of the condition back of the behavior is hidden. Affectation in speech, gait, dress, manner; grimaces; and tics are assumed in general to be the indirect and disguised expression of some earlier experience. Dreams illustrate very strikingly the extent to which symbolization may be carried. When *undisguised* wishes and desires occur in sleep, they tend to cause nightmares. Ordinarily, slumber is undisturbed because the dreams appear as disguised forms of previous wishes.

When symbols appear in somewhat exaggerated states, we have the abnormal. The case of Elizabeth is a striking illustration of the mechanism of symbolization; Lady Macbeth's hand-washing behavior was also symbolic. Jung gives an interesting case in this connection. A patient of long standing spent her entire time in repeatedly carrying out a simple stereotyped action. She sat all day moving her hands much in the manner of a cobbler sewing shoes. Her history showed that as a young girl she had been engaged to a shoemaker. But her sweetheart broke the engagement. In the days that followed she suffered great conflict. Strong repression of her feelings and desires for her lost lover then followed with immediate expression in the symbolic form of stereotyped actions. Many individuals in institutions for mentally deranged spend their whole lives in repeatedly doing some single act or in speaking some word or phrase. The case is related of one patient who spent his days and filled his waking moments at night repeating again and again: "It is all wrong; it is all wrong."

Projection. Where a complex exists, we frequently find the phenomenon of *projection.* The patient experiences those undesirable aspects of himself, which he cannot bear to face in himself, as actually belonging to others—as being characteristics of others. In this way the individual escapes all feelings of self-condemnation. Furthermore, he can actually feel superior to others; he can criticize their faults. Through projection any chance of further conflict is avoided. The individual has a clear mind. The normal individual who is unsuccessful tends strongly, at times, to project his troubles and failures upon the world. The world does not give him a chance. In the army, as we know, it was "a matter of all being out of step but Jim." In his sexual dereliction,

man, since the time of Adam, has often found a ready salve to his conscience by blaming the woman: "It was her fault," he pleads. "She tempted *me*." In abnormal cases, the individual projects some desire—some form of behavior—upon others. He may hear others speaking about him, accusing him of acts disapproved by society. Projection in these cases may lead to murderous attacks upon others.

Regression. In addition to repression a conflict may be resolved by *regression*. Where thwarting occurs, and where there is no "adequate" way out, the individual may drop some of his adult patterns and again exhibit earlier patterns. He makes use of patterns outgrown but not discarded. He ceases for a time to be fully grown. Although the situation calls for adult behavior, yet he acts in an infantile way.[1] This sort of activity appears normally, for instance, in those who drop into "baby talk" under certain situations of a sentimental or emotional nature. In the abnormal, regression may lead to peeping; to childish bursts of anger in which the individual throws herself on the floor or jumps up and down, all the while screaming perhaps as loudly as she can; or to exhibitionism. It is quite all right, according to society, for little children to peep, scream, or go naked, but society ignorantly condemns the "adult" who may be hulking in body, but who has never fully escaped from the *behavioral patterns of childhood*. Not so long ago a highly educated man who was apprehended as a "peeper" was roughly handled for a time. The common notion in all such cases—where any notion exists—is that persons guilty of such conduct have the "old devil" in them to cause them to act in this way. The psychologist would not say that such persons had anything devilish in them. He would say, however, that certain strong forces arising from conflict were at work in an individual to cause him to act in this way. His behavior, the psychologist would maintain, is the result of strong

[1] Noyes cites the following interesting case of regression: "The history of one patient of my acquaintance shows that although rather sensitive and shut-in by temperament she was a young woman of average record and prospects. Gradually certain conflicts constituted an insurmountable obstacle in the path of the developmental progress which her psychic energy should normally have followed. After a period of internal struggle her interests, her activities and even certain of her physical characteristics reverted to those of a child. She is now a middle-aged woman and for years has been in a hospital where all day long she nurses and tends her doll, talking to it in a high-pitched childish voice. Her manner, her behavior and her language are all childish. Her mental energy no longer finds satisfaction in dealing with the problems of an adult, but in the pleasures of a child. In many cases comfort for the patient is not secured until the retreat has gone farther than in the case of this woman, and regression may continue until there are exhibited characteristics common to earliest infancy" (*23*, 44).

thwarting, deep repression and symbolic expression. As he sees the matter, thinking individuals should extend pity—not blows—to unfortunate persons of this sort.

Phantasy. Conflict may be settled by *phantasy*. The individual escapes reality through his imagination. He takes refuge in a dream world, the boundaries of which are marked only by the limitations of his imagination. In phantasy, the individual may wander at will. This way offers an open door to full freedom from a too stern reality. But, occasionally, individuals wander so far afield that they cannot successfully return. They are, then, counted among the "insane." Many individuals sit year after year in our institutions for mentally diseased and "speak not nor care what happens." They sit in a brown study to which at times all doors are barred. It is extremely difficult to penetrate to them. They move in a world which they literally carry with them. Rosanoff cites the following case of a school teacher who was mentally diseased in this manner. Perhaps it will give some notion of this "way of all dreams."

Theresa C., formerly a school teacher, at present (1905) a patient at the Clermont Asylum, aged thirty-four years. The disease came on at the age of twenty-five. For several years this patient has lived in a state of apparently complete unconsciousness, incapable of carrying out the simplest commands or answering the most elementary questions. The facial expression is silly. The patient spends most of her time sitting in a chair or wandering about the courtyard, talking incoherently, her utterances showing marked stereotypy. The word "mystery" keeps recurring in the manner of a *Leitmotiv:* "To digest the nature of mystery, Claude of mystery, Matthew of mystery, Joseph of mystery. It is a conflagration, it is a petticoat, it is an oblation, resurrection, when you wake up like brutes. Mystery, of mystery, forty-eight of mystery," etc. Totally indifferent to everything, she manifests not the slightest emotion when spoken to about her family, or when offered her release. She is filthy in her habits. And yet, when a pen is put in her hand she will write disconnected words or fragments of sentences *without a single orthographical error* (*28*, 232).

Dissociation. One final way of settling conflict remains to be discussed. It is the way of *dissociation*. Where two incompatible goals or two standards of conduct conflict, the individual may develop what is called "logic-tight compartments." The business man, for instance, may keep business "ethics" completely divorced from his religion, from his ordinary notions of what constitutes dishonesty and fraud. If he were to bring them together, they would clash. As it is, he is one person at one time, and another person at another time. Under exagger-

ated conditions of dissociation, we get the striking delusions of the mentally diseased. A person may scrub the floor, but at the same time describe volubly the wealth of his kingdom and the number of his subjects. Dissociation is perhaps a fundamental mechanism in many cases of amnesia,[1] in dual personality, and in functional paralysis. In all these cases, a part of the total personality is functionally *cut off* from the whole.

We recognize that psychological diseases may have many causes. Some of the causes are physical; some of them are psychological. Of the psychological, the most important or primary one is conflict. Conflict is struggle where two opposing goals are offered. The conflict may be settled in one or more of several ways. The degree of mental health enjoyed by the individual depends largely upon the manner in which he settles the conflict. Where full repression occurs, a complex exists. The manifestation of the complex constitutes the symptom or symbol of mental disease. Each symptom is definitely related to its source. A group of them make up a disease pattern. It is the task of the psychologist or psychiatrist to interpret correctly such symptoms or symbols. He realizes that some diseases are the expression of regressive tendencies. Others represent an attempted flight from or into reality. Others represent the products of projective mechanisms. And still others come out of dissociative mechanisms. We turn for a brief word upon the significance of mental diseases after which we go to a description of the disturbances of the psychological functions.

SIGNIFICANCE OF MENTAL DISEASES

An introductory chapter on mental diseases cannot be wholly complete without the inclusion of a brief survey of the extent and economic significance of such disturbances. The student should know something, at least, about the importance of mental disorders—how serious such

[1] "It is a general rule that when a person passes from a condition of extreme dissociation to the normal state there is a tendency for *amnesia* to supervene for the previous dissociated state (multiple personalities, epileptic and hysterical fugues, hypnotic and dream states, etc.). Likewise in every-day life it frequently happens, when the dissociation effected by emotion results in an extremely retracted field of consciousness, that, after this emotional state has subsided and the normal state has been restored, memory for the excited retracted state, including the actions performed, is abolished or impaired. Even criminal acts committed in highly emotional states (anger, 'brain storms,' etc.) may be forgotten afterwards. In other words, in the normal state there is in turn a dissociation of the residua of the excited state. The experiences of this latter state are not lost, however, but only dissociated in that they cannot be synthesized with the personal consciousness and thereby reproduced as memory" (*27*, 508).

diseases are in terms of the number of cases, the cost of maintenance, and the misery which they produce. Statistics have been repeatedly gathered on the first two points. We can offer no objective measure of the last. We can only give the opinion of William Mayo of the Mayo Clinic that "neurasthenia, psychasthenia, hysteria, and allied neuroses are the causes of more human misery than tuberculosis or cancer."

In 1923, there were, according to the Federal Census Bureau, 267,617 persons confined in institutions for mental diseases in the U. S. This is equivalent to 241.8 per 100,000 of the general population. Since this vast army of mentally diseased persons requires about as many hospital or institutional beds as do all the so-called "physical" diseased put together,[1] it is easy to understand that Mayo had clear justification for his statement about mental diseases as causes of human misery.

An analysis of the various hospital cases of the insane with respect to type of disease gives some interesting results (*24*). About 15% of the yearly admissions to institutions for the psychologically disturbed belong to the manic-depressive type. About 28% enter the hospitals with dementia praecox. Since the latter tend to remain in the institution much longer than the manic-depressive and the paranoic group (about 1.7%), they actually constitute almost 50% of the total institutional population. These three diseases—dementia praecox, manic-depressive, and paranoia—account for about 45% of the total number *admitted*. These are the major functional psychoses or the true functional "insanities." Cases of senile dementia and arteriosclerosis constitute about 17%, and general paresis accounts for 10% of the total number committed to hospitals for the mentally diseased. The remainder of the population includes those suffering with diseases due chiefly to alcohol and drugs, and the epileptics and the psychoneuroses.

Considering the significance of mental diseases in the country as a whole, James May, Superintendent of the Boston State Hospital, has remarked:

> Although the incidence of mental as compared with other diseases prevalent in the community cannot be established with absolute accuracy, sufficient evidence has been presented to warrant the statement that from the standpoint of the public health we are dealing with no other problem of equal importance today. The state care of mental defects, epilepsy, tuberculosis and the deaf, dumb and blind is, for various reasons, of much less consequence to the community than the hospital treatment of mental diseases. The defective, delinquent. criminal and dependent classes combined do not equal in

[1] *Mental Hygiene.* 1927, *8*, 2.

number the population housed in our state hospitals for mental diseases. Nor does the number of cases cared for in the general hospitals of the state, county or municipal type compare in any way with the mental cases coming under state or federal supervision. It can, I think, be said without any fear of contradiction that no other disease or group of diseases is of equal importance from a social or economic point of view. Perhaps nothing emphasizes this fact more strongly than the report recently issued from the Surgeon General's office relative to the second examination of the first million recruits drafted in 1917. Twelve per cent of these were rejected on account of nervous or mental diseases. The number disqualified for service finally reached a total of over sixty-seven thousand" (*18*, 30).

While the evidence is not wholly unambiguous, there is some indication that the number of cases of mental diseases is increasing.[1] In order to determine the true facts in the matter, we should be forced to take into account not only those persons who are actually cared for in hospitals for mental disease, but also those persons with mental disease in the community and in other institutions, such as almshouses and penal and reformatory institutions. In the absence of community data and with incomplete data for other institutions, we use the census of hospitals for mental disease as a rough index.

The Federal Census Bureau has made eight enumerations of persons suffering from mental disease. The first such census was taken in 1850, and the last one available to us in 1923. The first five such studies were made in connection with the census of the general population in the decennial years from 1850 to 1890. In each of these an attempt was made to include the insane in the general population as well as those in institutions. The results show that in 1880 there were 37,432 insane listed in institutions for their care, or 97.1 per 100,000 of the general population; in 1910, 187,791, or 204.2 per 100,000; and in 1923, 267,617, or 241.8 per 100,000. These data include only resident patients in institutions for mental disease. One would expect a comparison on this basis to show a considerable increase on account of the actual accumulation of cases in the hospitals.

Two recent reports show a serious increase in the institutional population of mentally diseased individuals. According to one report,[2] hospital cases of this type increased 13% in a two year period ending in 1929, while all other types increased less than 3%. During this same

[1] In this connection we note a remark of Schlapp and Smith to the effect that the "rising tide of madness is not limited to the United States but is general over the Occident" (p. 126).

[2] *Illinois Health Bulletin*, May, 1929.

period, the general population increased from an excess of births over deaths by about 2%. A second report by the *American Medical Association*[1] summarizes the matter as follows: Nervous and mental hospitals for the insane are growing far faster than all other types of hospitals combined. There are just nine more nervous and mental institutions than there were two years ago but in that period their total capacity has increased from 373,364 to 414,386 and the average number of patients and inmates has grown in the same period from 349,667 to 395,407. If the present rate continues, and there is no apparent reason for thinking it will not, by 1934 we will have more than one-half million persons in our nervous and mental institutions. This situation most seriously challenges the government and the people of the United States.

A better method for measuring the increase of mental disease would be a comparison of the number of first admissions. Unfortunately, the recent Federal censuses are the only ones in which first admissions are separated from the others. During the year 1922, there were 73,063 persons who entered hospitals for mental disease for the first time. The census of 1910 did not separate admissions, readmissions, and transfers, but the total admissions of that year were more than 33,000 less than the total admissions for 1922.

A number of factors tend to obscure such results as the above and to interfere with a clean-cut statement concerning the extent of increase, if any, in mental diseases. We know that in recent years more reliable diagnoses of mental diseases are being made. While earlier an individual might have been considered as peculiar, he is now held to be diseased. Moreover, mild cases are apparently being institutionalized to a greater extent than ever before. Again, the public is coöperating with administrators to a greater degree with the result that more persons who suffer with psychological diseases are picked up. Finally, there is a decided tendency to send insane criminals to the institutions to which they belong instead of holding them in county jails or on poor farms and in almshouses. As it stands, the evidence points to a definite increase in the number of mentally "afflicted" persons in our institutions. This does not necessarily mean that an actual increase is to be found in the general population. Many able students, however, insist that the increasing pressure of modern civilization is definitely resulting in an increase in mental diseases. A larger percentage of the population is going "crazy."

The total cost of maintaining the mentally diseased runs into a

[1] *Journal of the American Medical Association*, 1930, *94*, p. 927.

staggering sum. An estimated amount[1] in 1920 was $75,000,000 annually. In 1913, 81 hospitals from 25 states reported a total expenditure of $39,791,347 for maintenance. These institutions had a total average daily population of 135,324 patients for the year. The average amount expended for maintenance for each patient was, accordingly, $294.05. Five hospitals in this group expended less than $200 per patient during that year, and four spent over $400. This group of hospitals represents about one-half the total population in hospitals for mental diseases in this country. Assuming that the average annual expenditure for maintenance for the other patients is the same as the general average for the hospitals that reported, we may safely estimate the annual expenditures for maintenance of all hospitals at $80,000,000 per year.

To the above expenditure we might add the total economic loss in earning power of these persons who are institutionalized. It is estimated[2] that each year about 75,000 patients are entering our institutions for the mentally diseased. If we place the average earning capacity of each of these 75,000 persons at one thousand dollars per year, we have a loss of $75,000,000. This is only for the "first admissions." A study of over 10,000 cases of patients who died in the New York state hospitals for mental diseases showed an average hospital residence of six years in these cases (*18*). It is easy to figure the tremendous economic loss to the country at large if the rate of entrance is 75,000 per year, and the average length of stay is six years. Of course, a great many remain for a short time. They either recover or die.

In closing this topic of the economic significance of mental diseases, we wish to cite a few figures dealing with the occurrence of psychological disorders of a major sort among the various economic classes of the country. An analysis was made of the occupations of the 104,013 admissions to state hospitals of New York. It gives a clearer notion of the tremendous loss in wealth to the nation through mental disease. The results are shown in Table XXVIII.

At no time has any attempt ever been made to determine the number of individuals who are partially or wholly incapacitated because of neurasthenia, psychasthenia, and hysteria. Many persons of this sort are quite unable to meet the tasks of daily life, although they are far from being "insane." Very few find their way into institutions, yet they may be very sick persons. We cannot even estimate the total loss to the nation through disturbances of this sort.

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[1] *Mental Hygiene Bulletin.* 1925, *3*, 4.
[2] *Mental Hygiene* (op. cit.)

TABLE XXVIII

Occupation	Number	Per Cent
1. Professional	1,926	1.8
2. Commercial (Bankers, etc.)	7,572	7.2
3. Agricultural	5,942	5.7
4. Mechanics at Outdoor Vocations	8,564	8.2
5. Mechanics at Sedentary Vocations	7,501	7.2
6. Domestic Service	21,037	20.2
7. Educational and High Domestic Duties	21,861	21.0
8. Commercial (Salesmen, etc.)	1,140	1.09
9. Employed at Sedentary Occupations	4,310	4.1
10. Miners, Seamen, etc.	581	.56
11. Prostitutes	81	.08
12. Laborers	12,962	12.4
13. No Occupation	7,820	7.5
14. Unascertained	2,715	2.6

We have sought, in this chapter, to introduce some of the general problems of the abnormal. We have reviewed the nature and symptoms of mental diseases, their causes and their significance. We turn now to consider certain disturbances of the psychological functions. We shall deal with action, perception, memory and recognition, imagination, emotion, and understanding and thinking. We shall then briefly consider in two chapters the major symptoms of the minor and major diseases. Finally, in a last chapter we shall consider problems concerned with the treatment of mental diseases.

BIBLIOGRAPHY

1. Adler, A., *A Study of Organ Inferiority and Its Psychical Compensation.* 1917.
2. Bridges, J., *An Outline of Abnormal Psychology.* 1925.
3. Campbell, C., *A Present-Day Conception of Mental Disorders.* 1924.
4. Church, A., and Peterson, F., *Nervous and Mental Diseases.* 1908.
5. Conklin, E., *Principles of Abnormal Psychology.* 1927.
6. Coriat, I., *Abnormal Psychology.* 1914.
7. Fisher, V., *An Introduction to Abnormal Psychology.* 1929.
8. Franz, S., *Nervous and Mental Re-Education.* 1923.
9. Freud, S., *A General Introduction to Psychoanalysis.* 1920.
10. Glueck, B., *Studies in Forensic Psychiatry.* 1916.
11. Hamilton, G., *Objective Psychopathology.* 1925.
12. Hart, B., *The Psychology of Insanity.* 1923.
13. Healy, W., *The Individual Delinquent.* 1920.
14. ———, *Mental Conflicts and Misconduct.* 1917.
15. Hollingworth, H., *The Psychology of Functional Neuroses.* 1920.
16. Janet, P., *The Major Symptoms of Hysteria.* 1907.
17. Jung, C., *Collected Papers.* 1916.

18. May, J., *Mental Diseases, A Public Health Problem.* 1922.
19. McDougall, W., *Outline of Abnormal Psychology.* 1926.
20. Morgan, J., *The Psychology of Abnormal People.* 1928.
21. Myerson, A., *The Inheritance of Mental Diseases.* 1925.
22. ————, *The Psychology of Mental Disorders.* 1927.
23. Noyes, A., *A Textbook of Psychiatry.* 1927.
24. Pollock, H., and Furbush, E., "Mental Diseases in Twelve States in 1919," *Mental Hygiene,* 1921, *5,* 353.
25. Pressey, S., *Mental Abnormality and Deficiency.* 1926.
26. Prince, M., "The Actuality and Nature of Subconscious Processes," *Jour. of Abn. Psychol.,* 1924, *19,* 129.
27. ————, *The Unconscious: The Fundamentals of Human Personality, Normal and Abnormal.* 1921.
28. Rosanoff, A., *Manual of Psychiatry.* 1920.
29. Taylor, W., *Readings in Abnormal Psychology and Mental Hygiene.* 1926.
30. Wallin, J., *Clinical and Abnormal Psychology.* 1927.
31. Watts, F., *Abnormal Psychology.* 1921.
32. Wells, F., *Mental Adjustments.* 1922.
33. White, W., *Outlines of Psychiatry.* 1921.
34. ————, *The Mental Hygiene of Childhood.* 1919.

CHAPTER XV

DISTURBANCES OF THE PSYCHOLOGICAL FUNCTIONS

There is nothing which is possibly of more vital concern to the Nation than a knowledge of the mental disorders to which its citizens are subject.—*Dr. Harvey Cushing, Surgeon-in-Chief, Brigham Hospital, Boston.*

Our task here is dealt descriptively and explanatorily with those changes which appear in the psychological functions of mentally diseased personalities. We have long recognized that the personality of one who becomes psychologically disordered may completely change from what it was under normal conditions. Friends of a person suffering with some major disorder frequently remark: "We wouldn't have known him; he is so different from what he used to be." These changes are of a functional sort although the whole personality may be involved. In order to treat adequately with these personality disturbances, it is necessary to consider briefly the various symptoms of mental disorders which appear in each of the outstanding ways in which an individual functions psychologically. We shall survey briefly the major manifestations of diseases as they occur in such activities as action, perception, memory, recognition, imagination, emotion, and thinking.

Men are always interested in behavior. In the disorders of action we come upon patterns of a clearly observable and interesting sort. In the behavioral idiosyncrasies and eccentricities of the abnormal individual we find very striking symptoms, probably the most bizarre of all. We wish to consider a few of these behavior abnormalities. They concern movements of the gross bodily sort as well as the more finely coördinated types involved in speech. Among the disturbances of the first, we shall consider *functional paralysis, increased and decreased activity, stereotypy,* and *compulsions.* Under the head of speech we shall speak of *mutism, stuttering* and *stammering.*

DISTURBANCES OF ACTION

Functional Paralysis. One of the most interesting forms of actional disturbance is *functional paralysis.* It is generally known that under

emotional excitement, a perfectly "normal" individual may be partially paralyzed for a short time. We hear persons remark, "I could not move. I was simply paralyzed through fear." Everyone has observed that the very timid person, when called to his feet before a crowd, may twist and squirm in his chair, and grow red in the face. He may actually be unable to rise to his feet. Some persons unaccustomed to speaking before crowds not infrequently find it necessary to hold to tables, chairs, and the like in order to stand. Their limbs may momentarily refuse to function in a normal way. Under abnormal conditions an individual may, for instance, lose his ability to walk or to write. Although he may be unable to walk, yet he can jump, dance, or hop on one foot. He may not be able to write, but he can use a knife or fork.

One kind of functional paralysis is *paraplegia*, in which a loss occurs in the ability of the individual to move the lower part of his body, particularly from the hips down. Janet has described a case of this type of functional paralysis which lasted eight years. A girl of twelve years of age became very angry and fought with a companion. During the fight she was thrown rather violently to the ground. The shock was not great, but her dress was dirtied "in a particularly significant part." The girl went home ashamed and greatly frightened, and sought to hide her fault from her parents. "The next day began a complete paralysis of both legs, which lasted eight years" (*8*, 140). Brown writes of the case of a soldier, who, while in action, became paralyzed from the hips down. Brown's report of the man runs as follows:

> Suffers from paraplegia, and is convinced that he cannot stand or walk. He says that this came on gradually, after a dump, of which he had partial charge, was blown up by bombs from a German aeroplane. At the moment the bomb exploded he ran for his life, but after a few seconds he found that his knees were giving way under him and he fell. This was the beginning of his paralysis. I find complete loss of cutaneous sensibility over both lower limbs and over the lower part of the abdomen up to about the level of the umbilicus (*2*, 138).

Paralysis may take the form of *hemiplegia* in which but one-half of the body is involved. In complete hemiplegia, the arm, the leg, and the face are all involved. The arm hangs quite limp and useless; the leg is dragged along in an indifferent manner. Speech may be either lost or greatly disturbed. The following report of a captain in the World War who suffered this disturbance illustrates very clearly the development of hemiplegic symptoms:

> On August 23, 1914, we came into action, and on the following day, whilst in a farmhouse, we were heavily shelled, the house being practically knocked

to pieces. My recollection of this incident is fairly clear, and at the time I noticed that every shell that burst seemed to concuss me at the back of my head near the neck. However, when I got out of this place I noticed nothing further for about *two days*, during which time we had had practically nothing to eat. Then I noticed that a mist was gathering in front of my *left eye*, accompanied by a violent headache. The colour of the mist was continually changing, and eventually, after a lapse of *six or seven days*, almost complete blindness set in. Coincident with these headaches and lack of vision a numbness began to settle gradually in my *left side*, a numbness similar to that when one's fingers became bloodless on a very cold day. It occurred first of all in the upper portion of my leg and gradually extended upwards till my left arm was affected, and the lower left side of my face became slightly puffed and sore. Almost immediately after this stage had begun to develop my left side felt as if it were paralyzed, locomotion being difficult and painful, and headaches becoming worse and more frequent (*2*, 141).

A final form of gross functional paralysis is *monoplegia*. Here a single limb or segment of limb is affected. The entire arm or leg may suffer, or only the hand or foot may become useless. In many cases, some condition such as unusual fatigue, a sharp blow, a physical injury calls the attention of the individual to the particular member. Perhaps the member may feel numb. This may be sufficient; paralysis now follows. Janet describes the case of a girl who unduly fatigued her right hand in learning to play a difficult piece of music in preparation for a public presentation. Later when she appeared in public to play the piece, she found that she was wholly unable to do so. Her right hand was completely paralyzed.

Increase and Decrease in Activity. In certain forms of mental disease there is greatly heightened activity. The individual may rush here and there, or he may hustle about in his "industry" being very busy at nothing. He may start to help here but instantly drop everything and rush to help out elsewhere. Perhaps he no more than gets started, however, than he rushes back to his first task or to another. He may tear up his clothing in order to provide rags for a rug and then without doing anything toward the rug, drop everything. He may, however, present the reverse of this whole picture. He becomes very slow and hesitant in his actions. Objectively viewed, it is as if every movement involves the expenditure of a very great effort. In some cases, the person simply refuses to do anything. He may not even speak. If he does, it may be merely to say that he is unable to do anything.

Stereotypy. In some forms of mental disease, we find a strong tendency to assume and to maintain rather curious bodily postures. In hysteria, an individual may see another in a certain posture and

thereupon take a similar posture and hold it for long periods. Janet writes of a woman who saw a case of tetanus in which the head of the patient was pulled far back. She in turn assumed and kept this posture for a considerable time. He refers to another woman who kept her feet extended much in the position of Christ on the cross (*8*, 134). In another form of disturbance the individual's members are "waxy." That is to say, when the individual's arms, legs, or body are bent to a certain posture, he will then continue in that position for a much longer time than would be possible for the normal individual. Gradually, however, the individual will resume a usual posture. The arm will unbend; the leg will stretch out; the body will straighten. Morgan writes of this tendency of some abnormal persons to hold curious postures:

> You may tell a patient of this type that he does not need to obey you, that you are just having fun with him, but he will maintain the posture in which you place him just the same. One patient being placed in an awkward position was asked why he stayed in that position. He replied, "You make me." Told that no one was making him, that it was just a joke, he answered, "Well, then it is a joke." But he maintained the posture just the same even while saying it was a joke (*12*, 285).

Compulsion.[1] In compulsive actions we find individuals behaving in ways which are obviously determined by their individual histories. They feel that they must do something in a given manner. There is usually no clear motive; the actions are often silly; yet they must be done. Thus, an individual must count each step as he climbs the stairs; he must follow with his eyes a particular figure as it runs through the whole of the border around the top of the room, or he must touch each lamp post as he passes it. He may, of course, be forced to walk up to some stranger and attempt to knock him down or mistreat him; he may be forced to kill his entire family, perhaps in a very unusual manner.

Many other forms of compulsions occur. These are tics in which the head may jerk, the forehead may wrinkle, the hand may twitch, the shoulder may shrug, the lips may curl, the eyelids may wink, and so on. The individual is always highly conscious of these activities, but he is very obviously unable, without aid, to rid himself of them. If he does attempt to restrain them, he may experience considerable distress until the tics again appear, whereupon the emotion attendant upon the restraint may immediately go. Usually, thinking about these compulsive actions generally serves to heighten them. When not closely regarded,

[1] The compulsion is closely related to the obsession. We shall discuss obsessions in the following chapter.

they tend to become less pronounced. Moreover, there are phobic actions in which an individual may tremble violently at the sight of certain objects; he may be unable to remain in a room the doors of which are closed; or he may be unable to walk across a fairly large open space such as a street. Finally, there are the strong and irresistible compulsions to drink, to mishandle others, or to steal.

The compulsion to steal (kleptomania) is of considerable interest since it points so clearly to the utter "senselessness" of the act and so tends to make the compulsive nature of such behavior more obvious. As an illustration of indiscriminate pilfering we list a few of the many articles stolen by a kleptomaniac student. They were "14 silverine watches, 2 old brass watches, 2 old clocks, 25 razors, 21 pairs of cuff buttons, 15 watch chains, 6 pistols, 7 combs, 34 jack-knives, 9 bicycle wrenches, 4 padlocks, 7 pairs of clippers, 3 bicycle saddles, 1 box of old keys, 4 pairs of scissors, 5 pocket mirrors, 6 mouth organs, rulers, guns, bolts, calipers, oil cans, washers, punches, pulleys, spoons, penholders, ramrods, violin strings, etc." (*10*, 441). Such a list as this shows, more clearly than anything we might say, the utter uselessness of the thieving. The same sort of thing was clearly shown in the case of a very wealthy student who was discovered to have stolen a large number of articles from other girls, in a local house. Some of these articles, including a valuable fur coat, were later found where the girl had hidden them. They were ruined by dirt and rain. She had not used them at all,—she had just taken them. Some psychological aspects of kleptomania are clearly laid bare by Schlapp and Smith in the following statement:

> Certain facts are obvious: namely, women are much more frequent victims of kleptomania than men; the pathological interpretation of the kleptomaniac's act is supported by the fact that there is no mercenary motive as in common thefts, which are distinguished from kleptomania by this circumstance; women most commonly yield to their kleptomania just before or during menstruation, in pregnancy and at the menopause; women in anemic condition, women psychically depressed or weakened by diseases and women under strong emotional stresses are common offenders of the kleptomaniac kind; men found afflicted with kleptomania are almost without exception either mentally unbalanced or grossly disturbed emotionally; most of these males are homosexuals (p. 214).

Disturbances of Speech. Of the various forms of speech disorder, no one is more interesting than *mutism*. Occasionally, under great fear a "normal" person may find himself wholly unable to shout for help. He wishes to call, but he cannot. Moreover, any timid person can testify

to the fact that he has greatly desired, time and again, to speak out boldly but found himself silent and "tongue-tied." In the abnormal we find individuals who are unable to speak for weeks, months, or years. The attack may come suddenly and remain long. McDougall reports the following case of a soldier who in time of battle suddenly lost his ability to speak:

A sergeant, fighting on Gallipoli, stooped to pick up a bomb which a Turk had hurled at him, intending to hurl it back at the enemy. As he reached for the bomb it exploded. He was not wounded or stunned; but he opened his mouth widely (without doubt as the first step in the natural fear reaction of uttering a cry), and then found that he could not close his mouth or withdraw his tongue, which remained protruding. After some hours his tongue gradually withdrew and his mouth closed; but he was then completely mute; he could not utter a sound. He remained mute for months, and proved to be a most obstinate case of mutism . . . (*11*, 237).

Stuttering and Stammering. Stuttering is a very common speech abnormality. At times, it is recognizably organic in nature, but in most cases it is a symptom of a serious psychological condition. That it is psychological is clearly shown by the fact that the stutterer can often read or sing in an untroubled manner; he can speak when alone with less disturbance than when addressing another; he also has less trouble when calm than when excited.[1]

Coriat has written very instructively of speech defects. Of stammering he has this to say:

All who have observed and treated cases of stammering have been impressed by one significant fact, namely, that in the large majority of instances the child did not begin to stammer until it had been talking freely and normally for several years. It is a significant fact, too, that all stammerers show a dread of speaking with a feeling of inhibition only in certain situations, in fact, a genuine attack of anxiety, and these psychic accompaniments of stammering can frequently be overcome by some form of suggestive therapy. In stammering we are dealing, therefore, with a form of morbid anxiety due to unconscious emotional complexes, probably early childhood memories. Many cases of stammering show excessive timidity and embarrassment in childhood.

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[1] Stuttering shows many variations. Blanton remarks from the results of a study of 200 stuttering children that "twenty-two were worse at school than at home; two were worse in town than in the country; one was worse on vacations; five varied with their physical conditions; sixteen were given to complete remissions in stuttering; one stutters only in school; one stutters only in Polish; one stutters only in speaking to his father; one never stutters while at play; one never stutters with members of his own sex . . ." (*19*, 394).

. . . Since stammering is due to unconscious influences, the proper treatment is psychological, directed to remove the deeply-rooted dread or anxiety from the unconscious (p. 381).

Defense Mechanisms. We must assume that in all of the several forms of disturbance referred to here,—that is, in functional paralysis, stereotypy, stuttering, stammering—a definite mechanism may be found in operation to account for the trouble. They are never accidental and meaningless. All these forms of abnormal behavior are, as Noyes remarks, "really as purposeful as the behavior of any one of us" who is normal. The mechanisms are, however, fairly carefully hidden. The effects are clear, but the motivating source is quite obscure. Functional paralysis is best considered as constituting a defense mechanism—a means of protecting the individual against an environment that threatens to overwhelm and perhaps destroy it. The greatly heightened activity, for example, is an attempt to ward off any possible reference to the conflictory conditions. Thus the abnormal individual is like the normal person who talks "much past the point" in order to avoid being forced to face the issue squarely. Greatly decreased activity should be taken to signify that the individual has failed in his efforts to find his way out through activity, and that he has taken refuge in phantasy. He sits quietly dreaming his dreams—there is no further call for activity. The conflict has resolved itself, and his world is complete within his imagination. The stereotyped behavior symptom is best considered as an indirect expression of carefully concealed repressions.

As an illustration of the genesis of a form of compulsive action McDougall cites the following case:

A tough regular soldier, who had seen much service at the front, displayed an obstinate tic, consisting in a twitching of the head towards the left shoulder. This was complicated by a continuous inability to hold his head erect; the neck was kept bowed forward. The history was as follows: He was advancing in an attack, carrying two heavy buckets of ammunition by means of a strap passed over his neck. While his neck was thus bowed by the burden, a shell-explosion buried him. In the light of other cases we may suppose with some confidence that, at the moment the shell fell, he made some violent movement of the head to the left, in order to free himself of his dangerous burden. When he recovered consciousness the tic set in. It was thus a fixation of a bodily attitude and movement of the moment of the emotional shock (*11*, 300).

In general, compulsive activities are to be related to unrecognized fears and strong repressions, particularly of a sexual nature. Finally, stuttering comes as the result of a strong feeling of inferiority and

emotional unstability of a fearful sort. We commonly speak of persons who are so frightened that they stutter. The stutterer is truly one who is afraid, either consciously on unconsciously. Bold and sophisticated individuals seldom stutter—only fearful and timid persons show such behavior. When the conflictory conditions which gave rise to such behavior are uncovered, when proper training in relaxation and poise is given, and when proper confidence is instilled in the individual, stuttering tends to go.

DISTURBANCES OF PERCEPTION

Perception is a way of getting knowledge about the world. Next to action it is one of the most frequent ways in which the organism functions. Because it is drawn upon in so many occasions, it furnishes many striking symptoms of mental diseases. Of the various abnormal symptoms to be found in these functions we wish to consider here only a few. We shall glance first at the *anaesthetic* and then at the *hallucinatory* symptoms or manifestations.

Anaesthesia. There was, in the days of the "witches," a standard procedure for ascertaining guilt. It consisted in a careful exploration of the skin (including the mouth surfaces) with a sharp probe to determine the existence of the "devil's claw." The "devil's claw" was, in reality, any patch of the skin lacking in sensitivity. However, to the witch-burners it was the devil's own stamp or trade mark. Its presence was considered to be undubitable proof of evil connections. And society often sent the witch in a pillar of fire to—where she belonged. Today, we recognize that functional anaesthesia is a very common symptom of some mental diseases. Many persons are quite incapable of seeing, hearing, or feeling, in part or in whole, although there may be nothing wrong *structurally* either with the person's eyes, ears, or skin; or with the nervous system. Such losses, we say, are, in reality, personality disturbances. We wish now to consider this matter of functional anaesthesia in some greater detail.

It is recognized that in certain situations where the attention is strongly directed to some object or event, a normal individual may have his skin lacerated without his perceiving it. We know that in the excitement of battle soldiers may suffer minor wounds, yet lack knowledge of their infliction. They cannot say when or where they received their injuries. Perhaps the sight of blood was the first indication of injury. We usually accept such cases as these without question. We merely say the person's attention was so distracted by other events

that he did not notice what was happening to him. We do not say, because the persons failed to perceive the injury (pain and swelling), that he was abnormal. In the same way, however, persons may, for fairly long periods, be completely lacking in sensitivity in certain regions. Such persons maintain that they cannot feel; and they show no evidence of pain when probed in the insensitive regions.

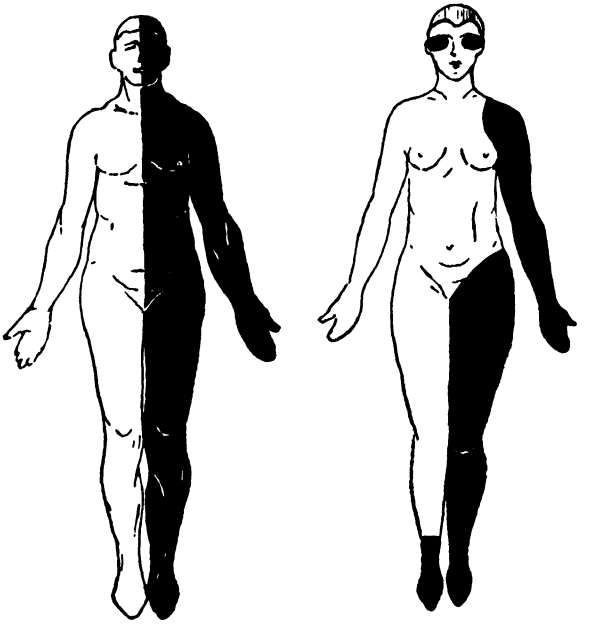


FIG. 47. Diagrams showing various forms of anaesthesia. Adapted from Janet.

Functional anaesthesia is purely psychological. The boundaries of the insensitive areas are those which common-sense sets as the limits of various bodily regions. The arm, the hand, the leg, the foot, the body organism from the hips down, or one-half the body are some of the common sense divisions of the body upon which anaesthesia may be established (*12*, 59). In anaesthesia of the hand the loss of feeling usually ends sharply at the wrist; in the foot it generally stops short at the ankle. In these two cases we have what is known as glove and shoe anaesthesia. In hemi-anaesthesia, one-half the body is insensitive. The line of demarcation runs squarely down the middle of the body. But this sort of distribution does not hold for the nervous system. The nerve fibers do not run toward the middle of the chest, for instance, and terminate sharply along an up-and-down line. Instead, they intertwine in a very

intimate manner so that it would be impossible through an injury to the nerves to secure hemi-anaesthesia of the sort shown in Figure 47, which shows the common-sense limits of some anaesthetic regions.

That persons may actually feel although they apparently do not know it—that is, are unable to experience pain and pressure in a normal way—may be shown, according to Brown, in a very simple way. Of this method (taken from Janet) Brown writes:

> We can ask the patient to say "yes" when he feels a pin-prick, "no" when he does not. We get him to close his eyes, and then silently explore different parts of his body. Whenever he is pricked on the normal part of the skin he will say "yes." When he is pricked on the so-called anaesthetic area of the skin he will often say "no," whereas if the area were really anaesthetic he would not know that it had been touched at all. Yet he is probably quite genuine in his belief that he has not felt the pin-prick (*2*, 3).

The fact that anaesthesia is purely psychological is also shown by the striking uses made of suggestion in producing and removing such disturbances. Under hypnosis, for instance, it is possible in a few moments to create insensitive areas in a perfectly normal individual so that he may no longer feel pain. This fact accounts, so we know, for the possibility of employing hypnosis for surgical purposes. Suggestion may operate, moreover, to shift the region of insensitivity. Thus it may be the right arm which is today affected, and the left arm tomorrow. The anaesthesia may be as jumpy as a case of "neuritis." Moreover, anaesthesia may disappear (just as functional paralysis may) in sleep, and under the influence of alcohol and drugs.

What we have remarked of tactual anaesthesia, holds also for the fields of visual, auditory, olfactory, and organic perceptions. In each of these, individuals may suffer complete losses so that they can no longer in the ordinary sense see, hear, smell, and taste, although there is no ascertainable change of a destructive nature in the anatomy of the body. The individual's eyes, for instance, may be quite normal structurally, but he is blind. The exciting cause may be some rather insignificant event. Consider the following case of blindness of this sort. It is cited by Janet:

> A man, thirty-eight years old, was busy cleaning a machine. A rag full of grease and petroleum caught in a gear and lashed him on the face. The face was only dirtied, and he did not trouble about the accident. He washed himself, but he had much difficulty in clearing his skin and eyelids of these fatty substances. He remarked that nothing penetrated into his eyes and that he felt no pain in them. However, after an hour, he seemed to see as if a mist were before him; this mist grew thicker and two hours later he could no

longer see at all. His vision fluctuated a little on the morrow and the following days. From time to time he could see a little, chiefly with his right eye. These fluctuations lasted for a month, then they disappeared absolutely and for four years he remained quite blind (p. 186).

The true occasion for many such diseases is conflict. The individual escapes from a painful situation (settles conflict) by developing blindness, deafness, insensitivity. The case is reported of a soldier in an observation post under heavy fire. As he lay staring through an opening, he was torn between desire to escape and a sense of duty to stay at his post. A shell burst just outside the wall and threw dust into his right eye. Although the eye was structurally sound, the man became blind in the one eye struck by the dust. Here, apparently, was a way of securing release from dangerous duties without any attendant disgrace. The conflict settled itself by blinding the individual.

Hallucination. Conklin writes of a case of mental disease:

Within my range of hearing, but beyond the reach of my understanding, there was a hellish vocal hum. Now and then I would recognize the subdued voice of a former friend; now and then I would hear the voices of some who I believed were not friends. All these referred to me and uttered what I could not clearly distinguish, but knew must be imprecations. Ghostly rappings on the walls and ceiling of my room punctuated unintelligible mumblings of invisible persecutors. Those were long nights (5, 31).

Here is a case of hallucination. In general, a hallucination may be said to be the perception of things "which do not exist." There is not physical object, or situation, perceptible by others; or perhaps perceptible to the hallucinated person *through more than one sense department.* The objects of visual hallucinations, for example, are quite "real," of course, to the individual even though he may be unable to feel them. The mentally diseased individual who has hallucinations does not, as a rule, say, "Oh, sure! that's just another hallucination. There is nothing to it." On the contrary, the voices heard, the event witnessed, the objects felt are generally regarded as being very real to the individual. He orders his conduct in the light of them; they determine his behavior. Mentally diseased persons talk day after day with some one who perhaps died many years previously. Or they talk with gods or devils. The profound significance of hallucinations in persons accepted by the world at large as being normal (at least, not mentally diseased) was strikingly shown in the life of Joan of Arc. We see that, as an immediate result of her hallucinatory experiences, she was led to a wholly new sort of life. As a remote result of her hal-

lucinations, she undoubtedly changed the whole course of European history. One has but to read accounts of the lives of many notable, historical persons to realize keenly the large part played by hallucinations. Very noble, as well as very infamous acts, have been grounded upon such experiences. In either case, the persons were functionally abnormal.

Hallucinations occur in all phases of perceptual life. There are auditory, visual, tactual, gustatory, olfactory, and somaesthetic hallucinations. Persons hear voices which condemn or praise; which are commanding or supplicating; which are angry or loving; which are loud or whispering. They may come from within or from without; from objects about the individual or from the open sky. Not infrequently they come from his associates. Moreover, individuals see objects of all sizes and forms; objects which advance upon the individual or remain dimly in the distance as if ready to attack at the first unguarded moment.

Persons have hallucinations of a tactual sort. In some mental disturbances, objects—vermin and the like—are perceived to crawl over the skin. Hallucinations of crawling vermin are clearly experienced under the abnormal mental state induced by the use of cocaine. The addict here may continually rub and scratch at his skin to get rid of crawling creatures. When he is unsuccessful in removing them, he may perceive them to be just "under the skin and out of reach." Hallucinations of smell and taste may occur. Usually they are of a decidedly unpleasant sort. Odors are experienced as being very nauseating. Materials which the individual may claim are inserted in his mouth by his enemies taste poisonous and are rejected. Such experiences frequently explain the disgusted look or the spitting behavior of some mentally diseased individuals. Organic and kinaesthetic hallucinations appear. The patient complains that his body is filled with lead, or it is as light as a feather—the organs are gone. He may feel objects moving about in his stomach. And in his vigorous attempts to free himself of them he may seriously damage himself. The individual may have hallucinations of floating in space, of bodily movements—walking and flying.

For an understanding of the significance of hallucinations, let us turn to a well-worded statement by Noyes.

It should be borne in mind that hallucinations are not mere matters of chance, but on the contrary have a definite significance in each case. They represent various aspects of the mind, but principally repressed wishes. If their expression were in a frank and recognizable form the patient would be much distressed to know that such undesirable and unacceptable trends and desires could be his. For that reason they appear in symbolic and disguised

form. These disguises cause the hallucinations to appear strange and foreign to the patient and conceal their real significance. There is reason to believe that if the hallucinations are pleasant to the patient they represent desires which are acceptable to him; on the other hand the unpleasant ones represent trends that are not consciously acceptable. As in the case of so many other symptoms of mental disease, hallucinations are often due to the conflict. Auditory hallucinations frequently assume the form of voices accusing the patient of misconduct, or of voices calling the patient derogatory names. In such cases the accuser is the ego-ideal and the accusations or derogatory terms represent the unacceptable wishes and aspects of the patient's personality. When the patient in reply scolds the voices he fails to recognize that he is berating the symbols of his own objectionable wishes and impulses. Sometimes the voices suggest objectionable conduct to the patient, the behavior suggested being an unsuspected wish of the patient. One patient complained of the odor of carbolic acid, an olfactory hallucination symbolically representing his desire for purification of certain undesirable tendencies (*14*, 67).

DISTURBANCES OF MEMORY

We wish to discuss here those disturbances which are commonly known as amnesia and paramnesia. The first is clearly memorial; the second is partly memorial and partly perceptual in character. Amnesia no more involves perception than does ordinary memory, while paramnesia has to do with the way in which some scene is abnormally perceived with respect to its familiarity. Every person, at some time, has been unable to remember the nature of some event in his past, although later the whole thing may come back to him in great clarity. This sort of momentary loss is quite normal. We all forget, and we think nothing of it. But a time comes—a stage is reached—when we are not quite so sure about the actual normality of some case of forgetting. It now looks as if it were abnormal. Let us consider an illustration.

Recently, the car in which an acquaintance of the writer was traveling at a rapid pace collided with another car, and was upset and thrown down an embankment. Friends who assisted my acquaintance from the overturned car advised her to see a physician immediately about a bad head bruise. To their astonishment, she insisted that there was nothing wrong with her, and that nothing could be wrong with her, for nothing had happened to her. She had forgotten about the approaching car as it came swerving down the road, forgotten about her own car turning over—in fact, she had forgotten everything that happened to her for more than an hour previous to accident. Her case was undoubtedly one of abnormal forgetting. It was out of the ordinary. It was unusual. We refer to such forms of forgetting as amnesia.

Amnesia. Amnesia is a loss of memory. It is an abnormal lack of ability to recall previous events. It is, in short, forgetting of the worse sort. We find that there are, when considered in terms of the amount and temporal relations of the materials forgotten, three general types of amnesia. In the first sort there is a memorial loss extending over a rather limited period of time. The above case is illustrative of this type. It means that a small block of one's past is momentarily or permanently cut off. Such blocking commonly occurs under periods of infectious diseases during which there is delirium; during an attack of a paralytic, epileptic, or hysterical nature; under severe injury to the head; and following strong emotional shock and conflict. The second sort concerns the memory of particular events. In this type of amnesia not all the memories which belong to a given period in one's life are dropped. Only those which are of a distressing character are pushed aside.

Janet cites a very striking case which we may use as an illustration in this connection. It concerns a girl who had nursed her mother during a long period of illness, only to have her die.

> After the mother's death she tried to revive the corpse, to call the breath back again; then, as she put the limbs upright, the body fell to the floor, and it took infinite exertion to lift it again into the bed. You may picture to yourself all that frightful scene. Some time after the funeral, curious and impressive symptoms began. . . . Her relatives, when she was conveyed to the hospital, said to us: "She has grown callous and insensible, she has forgotten her mother's death, and does not seem to remember her illness." That remark seems amazing; it is, however, true that this young girl is unable to tell us what brought about her illness, for the good reason that she has quite forgotten the dramatic event that happened three months ago. "I know very well my mother must be dead," she says, "since I have been told so several times, since I see her no more, and since I am in mourning; but I really feel astonished at it. When did she die? What did she die from? Was I not by her to take care of her? There is something I do not understand. Why, loving her as I did, do I not feel more sorrow for her death? I can't grieve; I feel as if her absence was nothing to me, as if she were traveling, and would soon come back." The same thing happens if you put to her questions about any of the events that happened during those three months before her mother's death. If you ask her about the illness, the mishaps, the nightly staying up, anxieties about money, the quarrels with her drunken father,—all these things have quite vanished from her mind (*8*, 30, 37).

A final form of this sort of memorial loss is known as general amnesia. It usually—not always—embraces the entire past of the individual afflicted. In such cases there simply are no memories left. Janet

describes the case of a well-informed, well-bred young lady of a good constitution who was suddenly seized, without previous warning, with a profound sleep, which lasted several hours longer than usual. On awaking, she had forgotten all she knew; her memory was like a *tabula rasa*, and had preserved no notion either of words or of things; it was necessary to teach her everything anew. Thus she was obliged to learn again reading, writing, ciphering. Little by little she became familiarized with the persons and things surrounding her, which were for her as if she saw them for the first time. Her progress was rapid.

Amnesia may also be considered in terms of the direction which forgetting takes with reference to a particular period of conflict or injury; that is, whether the loss affects the memories which preceded or which followed the crisis. For instance, a person suffers an injury. He may later forget everything that happens to him during that period which immediately follows the injury. This type of interference or loss is commonly referred to as anterograde amnesia. It accounts for the fact that a person, as the result of some shock today, may be unable to remember events which happen tomorrow.

The other type which belongs in this classification is retrograde amnesia. Here, curiously enough, the effect of shock or injury reaches back through the past and obliterates those events which *preceded* the injury. An individual is injured *today*, but he remembers nothing of that which happened yesterday. In senile dementia, for example, the loss of memories gradually extends back more and more into the past. The more recent events are the first to go; then the remote events fall before the advancing tide of oblivion.

Paramnesia. Burnham writes of a case of this sort.

> One morning while on my way to the city, I left the house and walked toward the place where I was to take the street car. . . . I suddenly found myself in a strange place. I looked ahead, to the right and to the left, and then turned and walked back, but in no direction could I see anything I had ever seen before. I walked back to the street I had last crossed and looked about as before, with the same result. Still it did not seem possible that I could have gone astray, as I could not have found strange ground by following the street I had started on without going a considerable distance, and I did not think I had been walking more than two or three minutes, and I did not think I had turned from that street. As there was nothing in sight which I could recognize I tried to recall the looks of the houses on my usual route and to compare them with those in sight, but I could not visualize them sufficiently to make a comparison (*3*, 382).

This experience represents a form of paramnesia. It is the per-

ception of a situation as being strange when it should be familiar. In such disturbances the individual can perceive spatially as well as before; he can see to read and the like, but the total situation is suddenly unfamiliar. The opposite side of the "picture" is found in a second form of paramnesic disturbance. Here the individual perceives a strange situation, or a situation which he has never faced before as being familiar, as having been lived through or experienced previously. This experience is so keen at times that it has inclined some to a strong belief in previous existence—in short, to a belief in reincarnation.

We may think of these disturbances of memory as being expressions of actual physical derangement of nervous patterns under head injury. In some cases, this is the only sensible position to assume. But we must realize that in a great many cases, such memorial losses can be best explained as the resultant of the phenomena of conflict, repression, and dissociation. If we grant loss of memory in "normal" individuals under emotional shock or struggle, without any structural disturbance—destruction of brain, laceration of nervous system, and the like—we are then in a position to realize the deep significance of the claims of the psychoanalysts and others; namely, that the majority of memory disturbances are purely psychological in origin. White makes the point clear:

> Things are forgotten because the person does not wish to remember them. The motive for forgetting is often largely unconscious. There may be, however, an element of conscious effort in that direction. People seem to prefer to forget disagreeable, gruesome and terrifying experiences. The painful events of a railway wreck are forgotten, often following a period of unconsciousness. The nurse who gives a fatal dose of medicine passes into a stupor from which she awakes with no memory of the painful event (p. 86).

DISTURBANCES OF IMAGINATION

Everyone employs his imagination in picturing objects and events as they might or as they could be. It is a way of experiencing in which one deals with objects not as they are actually given in perception but as they are thought about. Some persons make very great use of the imagination; others draw very little upon it. There are some who employ the imagination as a way of escape whenever they suffer severe conflicts. In phantasy they create an ideal world in which they move in high honor and esteem, achieve their goals, or satisfy their intimate desires. At times, the phantasy takes a distinctly sorrowful tone. The individual fancies himself broken in health—doomed to life-long suffering. But since he faces it so bravely and heroically, he earns the ad-

miration of all those about him. Where the imagination is too heavily drawn upon in these ways to create such a world of phantasy, mental abnormalities result. The individual finds the difficulty of facing reality altogether too great; he retreats permanently to a dream life.

Where the imagination is too vivid, mental abnormality may also exist. Some previously experienced face or some scene may come before the individual in great vividness. Regardless of what he tries to do or where he turns, the object is there. He cannot read because that which is given in imagination stands between him and the page. Or he cannot attend to what another says because in imagination he may hear the voice of another. Some of the war neuroses, in hospitals far from the firing line, seemed still to hear the screaming of shot and the bursting of shells almost as clearly as when in the front lines. Their lives were tormented by the roar of a battle that raged only in their imagination.

Finally, imagination may show abnormal symptoms in terms of what has been called "flight of ideas." Here some object, situation, or word will release a train of imagery that at times wanders greatly, jumping from here to there in an apparently incoherent manner. All such associations are assumed to be tied together, but it is a difficult task at times to determine the linkage. The following example of discourse will show clearly the nature of this flow of thoughts where some degree of coherence still remains.

Do you know I was kidnapped to be sent here twice. I saw a mock funeral of me before I left home. This was done because I am a great inventor. The pope of Rome is the greatest human being in the universe. He is the head of the Catholic Church. My head (association of the word head in two different meanings) is good and sound, and I am certainly not insane. Do you hear the ticking of the clock? (External association.) It says, "call the little heifer, the heifer is sick." Did you ever see the gloves veterinary surgeons use when they doctor sick cows? (Internal association.) How would you like to be a veterinary surgeon? Say! what are you keeping me here for anyhow? I want to go home. (Here he was asked how he slept at night.) I have slept excellently; that is because I am of such a strong constitution. The constitution of the United States (association as above with the word head—probably the association is in large part at least a sound or—as it is called—a *clang association*) was signed by Thomas Jefferson. He was just a man, but he was not the inventor I am (*21*, 78).

DISTURBANCES OF EMOTION AND MOOD

We recognize the tremendous significance of emotions and the moods in our every-day life. They color a large part of our perceptions, memories, and thinking. They are inextricably tied up with our behavior

patterns. When exaggerated, they produce some of the more startling cases of psychological abnormalities. The average person pictures the "insane" as being either a fighting, screaming, tearing sort of person, or one who is very sad and depressed, perhaps one who cries for days at a time. In either case, the picture is of a very emotional creature. While we recognize many exceptions, it is quite evident that a majority of the persons who are mentally diseased are more inclined to be disturbed emotionally than are normal individuals.

Emotional abnormalities take many forms; but we can discuss only a few. We wish to consider the disturbances which occur in such emotions as joy, sorrow, fear, love. In the disorders of joy, the individual may exhibit only a mild degree of joyful feeling. He gives the clear impression of being very well satisfied with life. He seems to radiate good cheer, even though his actual condition is such as to lead one to think he should show a more serious and thoughtful attitude. He is expansive and boastful; he may proclaim himself equal to any task. He recognizes no possible failure. He is an irresponsible and irrepressible optimist. However, when unduly crossed, he may grow insolent, irritable, and even dangerous. In many such cases, this joyful pattern is replaced after a time by one of sorrow. The reverse side of the picture is now seen. The individual is greatly depressed. He gives the general impression of a normal person who is greatly worried, dejected, and downcast. This phase of disturbance also exhibits varying degrees. From a general air of mild sadness and pessimism, the person may pass into one of complete despair and utter desperation.

Frequently, we find mentally disordered persons who are dreadfully afraid. They cower in their rooms, afraid even to step into another room. They may be afraid only of one thing; they may be fearful of almost every object in their environment. The fear takes many shapes. Some individuals are so afraid of being poisoned that they will not eat. Food has to be forced into them. Or they are afraid to go to places and do things. We find many individuals outside institutions who are mentally disordered in this fearful way. They suffer, we say, from phobias. Leonard, in his book *The Locomotive God*, has drawn a fascinating picture of a mentally disturbed personality who is able, nevertheless, to do good work. Phobias are of many sorts. They range from the fear of some small specific object to a "general" fear of large open spaces. They may accompany one during most of one's wakening life. The following case, which may be taken to illustrate the first sort of fear, came to the writer's notice. A mature woman had a very strong fear of chickens. She could not bring herself to touch them—she could not even assist

in their preparation for the table. It developed that as a young child she had gone into the chicken yard on a number of occasions and had picked up tiny chickens with serious results to the chickens. She was punished for her misdeeds and apparently forgot the matter. However, she did not go near the chickens. Later when called upon to handle chickens—to prepare them for cooking—she found that she could not bear to touch them.

A case illustrative of a fear that may haunt one during most of one's life is taken from Bagby.

A certain man suffered from a phobia of being grasped from behind, the disturbance appearing in early childhood and persisting to his fifty-fifth year. When walking on the street he found it necessary to look back over his shoulder at intervals to see if he was closely followed. In social gatherings he arranged to have his chair against the wall. It was also impossible for him to enter crowded places or to attend the theater. His other difficulties can readily be inferred. Significantly, he could give absolutely no explanation of the origin of his fear.

In his fifty-fifth year he returned to the town in which he had spent his childhood. After inspecting his old home, he went to the corner grocery and found that his old boyhood friend was still behind the counter. He introduced himself and they began to reminisce. Finally the groceryman said this: "I want to tell you something that occurred when you were a boy. You used to go by this store on errands and when you passed you often took a handful of peanuts from the stand in front. One day I saw you coming and hid behind a barrel. Just as you put your hand in the pile of peanuts, I jumped out and grabbed you from behind. You screamed and fell in a faint on the sidewalk" (*1*, 47).

A fourth form of emotional abnormality involves the emotion of love. We recognize, for example, that individuals may fail to develop a normal emotional life of this sort. They sometimes fail to get beyond the period of strong love of a mother or of a father. They remain below the full level of their emotional potentialities. They exhibit what is commonly known as fixated behavior. The fixation may be either upon the mother or upon the father. Girls tend to fixate upon the father rather than upon the mother. Boys, on the other hand, tend to fixate upon the mother rather than upon the father. If this fixation remains permanently, the individual finds too much satisfaction in the parent, although the whole affair may be largely unconscious. Individuals of the opposite sex who might make admirable mates hold little attraction. Until individuals sever the unduly strong parental attachment, they cannot properly regard other individuals in the world at large as suitable

love objects. Again, if the level of development does not reach a stage in which an individual shifts his love from a member of his own to a member of the opposite sex, he may be homosexual. Or if emotional conflict becomes too great, an adult individual may again make use of those behavior patterns which belong to an earlier level of emotional development, and as a result exhibit homosexual behavior.

A final form of disturbance of this function consists in a loss of all emotion. Here we find apathy and indifference. Lacking his full emotional life, the individual lives a drab, colorless existence. He neither hates nor loves; neither desires nor repulses. He knows nothing of joy and sorrow, or of pleasure and pain. Ribot, for instance, maintains that the deterioration which sometimes occurs in emotional life assumes a definite order of progression. The emotions break down in the following order: first, the intellectual and esthetic; then the altruistic; then the sexual and the ambitious; and finally, those most directly concerned with ôneself (according to Ribot's terminology, the egoistic and the self-preservative). We do recognize that before they finally lose interest in themselves, individuals apparently lose all interest in objects and persons round about them. In this sense Ribot's description is probably correct. We know that during the progress of some mental diseases, individuals become "exceedingly self-centered, avaricious, oblivious of the rights and comforts of others, and dead to the nobler sentiments and aspirations of life" (*20*).

DISTURBANCES OF UNDERSTANDING AND THINKING

In mental disease, action may be paralyzed; perception may show hallucinations; memory may suffer serious losses; imagination may run wild; emotion may be exaggerated or stunted, and thinking may be deluded. Disturbances of action, perception, memory, and emotion may be bad, but disorders including delusions are serious. In fact, the delusion constitutes an outstanding symptom of major mental diseases. An individual may suffer most of his life with some of the minor forms of mental disease without experiencing delusions and without attracting much attention. When delusory symptoms appear, we at once recognize the seriousness of the disturbance. The individual can no longer think straight. He may now become a menace to society.

Delusions, we say, are false beliefs. It is very difficult at times to separate false beliefs which are abnormal from false beliefs which are quite normal.[1] The following story told of Esquirol, the famous psy-

[1] "One person believes that the sun (or the earth) actually did stand still in response to Joshua's command; his neighbor does not believe that such a phenomenon

chiatrist, illustrates, we trust, the difficulty of distinguishing the deluded from the non-deluded. A student asked Esquirol if there were any signs by which the deluded might be distinguished. Esquirol did not answer directly. Instead, he invited the student to dine with him. At the table were two other guests, one of whom was quiet, well-dressed and apparently highly educated. The other person, however, was somewhat uncouth, rather noisy and apparently very conceited. When the student was leaving, he remarked, "The problem is very simple after all; the quiet well-dressed gentleman is certainly distinguished in some line, but the other is certainly a lunatic and ought at once to be locked up." "You are wrong, my friend," Esquirol is said to have replied with a smile, "that quiet well-dressed man who talks so rationally has for years labored under the delusion that he is God the Father; whereas the other man, whose exuberance and self-conceit have surprised you so greatly, is M. Honore de Balzac, the greatest French writer of the day."

The criteria of delusion mainly concern the person's history and his own surroundings. The distinction between the delusion and normal false belief cannot be drawn in terms of behavioral pecularities, for the behavior of the deluded person may be quite like that of a normal individual. One may firmly believe that he is loved by some woman—and he may not necessarily be deluded. Another believes that he is loved perhaps by the same woman, and he is unquestionably deluded. If we know from the history of the second man that the woman in question has never seen him or heard of him, or if we discover no evidence on the part of the woman that she loves the man, we are quite justified in assuming that he is deluded. We are further confirmed in this interpretation of the individual if he steadily refuses to recognize that he is wrong when very good reasons, showing him to be wrong, are advanced.

Delusions assume various forms. Two common types are those of *persecution* and of *grandeur*. In the former sort an individual may contend that everyone watches him; that he is the object of conversation in which condemnatory remarks are made; that others are scheming to attack him. The most trivial event may be greatly exaggerated and made to bear personal reference. A stick found on the side walk is interpreted as having been placed there to trip and injure him. Or it is taken as a secret sign pointing to the direction from which the waiting enemy expects him to come. He may, therefore, either walk around the

occurred. Neither man suffers from a delusion in a psychiatric sense. False beliefs based on certain similarities are not to be looked upon as delusions, *e.g.*, for a person to believe that a bat is a species of bird because it flies is not evidence of a delusion" (*14*, 69).

stick or simply refuse to go ahead. Again, either too little or too much food means intended death through slow starvation, or death through overeating. At times he may grant that he has sinned, or done some wrong, and is consequently deserving of blame. He resignedly faces his punishment. Here we usually get depression and sadness. The individual patiently awaits his fate. On the other hand, he may openly and violently resent any attempt to speak disparagingly of him or to injure him. Here we often get violence and danger—the individual may suddenly attack his dearest "friend" with murderous intent. The friend is the cause of this trouble. Noyes remarks that in Washington one finds many delusory individuals who come there to seek protection from enemies, or demand that the government take an active hand against their foes.

Another classification gives the *systematized* and the *unsystematized* forms of delusion. In the former, coherence and a fairly sensible degree of compatibility exist between the delusion which the individual holds and his behavior. A person claims that he is a king, decks himself out in what finery is available, walks and talks in a pompous, stilted manner, and perhaps refuses to associate with the common herd. The presence of a degree of pomposity in some individual wholly at variance with his social history, occupation, and station in life is sufficient within itself to raise the possibility of a systematized delusion. In the unsystematized delusion, individuals make no attempt to live up to the delusion. They strenuously maintain their delusions in words, but they openly defy them in deeds. We find a complete separation between belief and behavior. Persons claim they are wealthy, but beg humbly for money; they assert that they are great scholars, but when one asks them a few questions, they are unable to answer. Some of them are quite clever at protecting themselves against any inquisitive probing. Perhaps the following story will make this point clear. "A visitor to an insane asylum was guided about by a trusty who to all appearance was as sane as anyone could wish. He explained lucidly all the various types of insanities, and showed an unusual familiarity with them. Finally the trusty and the visitor stopped at a room where a man who was suffering from religious delusions called out, 'I'm Almighty God!' 'Don't believe him,' said the trusty quickly, '*I'm* Almighty God.' The visitor made no immediate reply, but, being tactful in handling such people, engaged the man in conversation, and when well within sight of the main office, he confidentially inquired, 'If you're Almighty God, I wish you would tell me the answer to a question that has long puzzled the wisest men. It says in the Bible that God made the world in six days. Now

were those days twenty-four hours long or a thousand years, or, as some suppose, millions of ages in extent?' The trusty smiled indulgently at him. 'Pardon me,' he replied, 'but I never talk shop.' "

The significance of delusions is fairly obvious. They stand at once as a way of satisfying a need and as the expression of a former conflict. They are in this respect quite similar to hallucinations. They permit the individual to create a world in which there is no conflict—in which he can live in peace. They are symbolic expressions of unconscious or repressed wishes. White, in summing up the significance of delusions, remarks that in delusion the individual has built "a world in which his wishes come true, usually in a highly disguised, symbolic form. Delusions are usually highly disguised wish formations, substitution products, compromise formations. They may be defense reactions, avoidances, compensations, projections" (p. 73). Delusions of grandeur commonly go with delusions of persecution. The former, according to the individual's way of thinking, serves to account for the latter. An individual is persecuted because he is a king whom a rival wishes to overthrow. He is a politician whom his enemies seek to destroy; he is loved by all women, so that other men plot his destruction; or, he knows a way of transmuting the baser metals into the precious metals, and a syndicate is after him to secure his invention. Because he refuses, his life is threatened.

We have briefly reviewed a few of the more outstanding symptoms of mental diseases as they are manifested in such psychological functions as action, perception, memory, imagination, emotion, understanding and thinking. In these functions we find all the usual symptoms of the minor and the major mental diseases. It is impossible to conceive of a mental disease in which there would be no disturbance in one or more of these psychological functions. In the two following chapters, which deal with the minor and major mental disturbances, we shall find the symptomatic disturbances of the various functions grouped together into a clinical picture—a word picture of a disease. Our immediate task now is to secure a clear picture of each of three kinds of minor mental diseases; namely, neurasthenia, psychasthenia, and hysteria.

BIBLIOGRAPHY

1. Bagby, E., *The Psychology of Personality.* 1928.
2. Brown, W., *Psychology and Psychotherapy.* 1921.
3. Burnham, W., "Retroactive Amnesia," *Amer. Jour. of Psych.*, 1903, *14*, 382.
4. Church, A., and Peterson, F., *Nervous and Mental Diseases.* 1908.
5. Conklin, E., *Principles of Abnormal Psychology.* 1927.

6. Coriat, I., *Abnormal Psychology.* 1914.
7. Givler, R., *Psychology.* 1922.
8. Janet, P., *The Major Symptoms of Hysteria.* 1907.
9. May, J., *Mental Diseases, A Public Health Problem.* 1922.
10. McCarty, D., *Psychology for the Lawyer.* 1929.
11. McDougall, W., *Outline of Abnormal Psychology.* 1926.
12. Morgan, J., *The Psychology of Abnormal People.* 1928.
13. Myerson, A., *The Psychology of Mental Disorders.* 1927.
14. Noyes, A., *A Textbook of Psychiatry.* 1927.
15. Pressey, S., *Menial Abnormality and Deficiency.* 1926.
16. Prince, M., *The Unconscious: The Fundamentals of Human Personality, Normal and Abnormal.* 1921.
17. Rosanoff, A., *Manual of Psychiatry.* 1920.
18. Schlapp, M., and Smith, E., *The New Criminology.* 1928.
19. Taylor, W., *Readings in Abnormal Psychology and Mental Hygiene.* 1926.
20. Wallin, J., *Clinical and Abnormal Psychology.* 1927.
21. White, W., *Outlines of Psychiatry.* 1921.

CHAPTER XVI

THE PSYCHONEUROSES

In neurasthenia, psychasthenia, and hysteria we face mental diseases which are now universally considered to be purely psychological in nature. In them, at times, we find very striking disturbances of the psychological functions. Individuals who suffer with some of these forms of disorders are unable to walk, or they cannot feel, or their memories are gone. In every case the disease is unquestionably psychological. This fact makes these disturbances particularly instructive. They show how the total organism may be seriously disrupted functionally, but remain apparently unmodified structurally. Bodily elements are not actually lacking in these disorders, as is true in some other forms. On the contrary, the organism stands structurally or anatomically intact. But it does not work as it formerly did. It works wrongly; that is, unlike the way in which the normal organism functions psychologically. Myerson remarks of the psychological nature of neurasthenia, psychasthenia, and hysteria: "There is nothing more mental than the insomnia, the fatigue, the fears, the brooding introspection, and the impaired joy of the neurasthenic; there is nothing more born of the mind than the phobias, the tics, the compulsions, the impaired consciousness of the psychasthenic and the hysteric" (*16*, 57).

These are known as the minor mental diseases. Individuals afflicted with such ailments do not constitute the truly dangerous types found in the more severe disorders. They do not fall into raging fits and murder innocent persons. They do not exhibit the clearly annoying and cranky behavior, characteristic of some of the major mental disorders which we shall discuss in the following chapter. In short, this group does not include the true "insanities." Such diseases are, therefore, not commonly represented in the institutions for the mentally diseased. They do, however, bear profound significance both for society and for the particular individual who is afflicted.

The extent to which efficiency is crippled, happiness is destroyed and suffering is caused by these diseases is almost incredible. Untold numbers of people, either having assumed that relief is unobtainable or having failed to find it

in medical advice and nursing attention, struggle on, unable to deal effectively and happily with difficult situations because of the great waste of energy in the internal struggles of conflicting tendencies and emotions (*17*, 173).

NEURASTHENIA

Of the three forms to be discussed here, neurasthenia is the most common. This fact alone makes this one disease significant. It is impossible to estimate the number of individuals who suffer at times with this form of mental disturbance. We are at least safe in saying that very few persons get through life without experiencing a touch of it, just as few get through life without having had the measles. Persons may continue for years with a mild form of neurasthenia much in the same way that another individual may go for years with gastric ulcers, eczema, or tuberculosis. Speaking for himself upon this point of neurasthenia, McDougall remarks, "I would claim to experience most of the symptoms of a mild neurasthenia nearly every morning on waking" (*14*, 220).

A major symptom of neurasthenia is fatiguability. In fact, it is regarded by some as being a functional, fatigue neurosis. All of the usual symptoms of fatigue, as found in the normal individual, are discovered in neurasthenia in heightened form. The neurasthenic individual is unable to perceive or to observe for any considerable length of time. He reports that he cannot "keep his attention" on any one topic. He finds it extremely difficult or wholly impossible to read or study even for short periods, because of the very great strain required to hold himself to the task. Since he is unable to confine his activities to any particular task for fairly long periods, he exhibits behavior like that of the very restless person. He is now here, now there. He may be unable to remain quietly settled in one place for more than a few minutes at a time. He frequently cannot sleep, so he roams from one room to another or walks the floor. With all this bodily activities, he reports a state of utter fatigue. He is simply "dead" with fatigue; yet he may be unable to rest. At other times he may refuse to get about, even to the extent of getting to the dining table. It may be necessary, in fact, to give him much the same care accorded an individual suffering from some major infectious disease.

In neurasthenia, the individual's perceptions may be disturbed, particularly in the direction of hyperaesthesia. He seems to experience objects which he would disregard were he in a normal condition. Slight noises such as those made by passing cars or by workmen on the street seem greatly to irritate the individual. He continually complains of

this and of that source of annoyance. Here we have merely an exaggerated picture of the ordinary person who becomes increasingly touchy with fatigue. Much of the neurasthenic annoyance of this sort is not due to an actual increase in perceptual acuity; that is, to an increase in ability to see, hear, or feel more sharply. It is rather a matter of heightened irritability. The person becomes more emotionally unstable, more likely to "blow up" under situations which are so mild that normally they would leave the individual unperturbed. This emotional instability is further evidenced by the general mental attitude of the individual. He is usually quite pessimistic in his outlook. Moreover, he is strongly inclined to be depressed and melancholic. He suffers prolonged spells of the blues. Quite frequently, his pessimism and depression are to be attributed (so he claims) to his state of health. He is not in very good condition. It worries him. When this concern about his organic state occurs in extreme form, we have the hypochondriac. He counts his pulse; he consults a physician about his arteries; he goes to a specialist about his nerves. He may be repeatedly examined for heart trouble and other ailments. Of this strong tendency toward self-examination, Coriat writes:

> The most striking point about the neurasthenic is his introspection, his continual morbid self-analysis. Only under the stress of intense emotions does the neurasthenic forget himself. The personality has become changed. Interest in things about him is lost, he feels broken up, depressed, anxious, cannot control his thoughts or feelings (*6*, 376).

But his worry is not necessarily confined to his state of health. He may exhibit great anxiety about his job, his studies, his finances, his social position, about his indiscretion of last year or the year before, although there may be no real occasion for even the slightest degree of worry over such matters. His anxiety may be concerned with some member of his immediate family or a friend. Here, again, he may be troubled about one or more of any number of possible conditions. We might say generally of the neurasthenic that he is a "borrower of troubles." Where no troubles exist, one may be sure he will be able to find plenty. He actually creates troubles both for himself and for others.

The neurasthenic shows other disturbances. As we said, he cannot sleep properly. He either has trouble in falling asleep, or he sleeps fitfully, with long waking stretches between. Moreover, he is often lacking in appetite. Foods do not taste right to him. Or he is simply unable to eat certain foods.[1] He complains of pains—shooting and

[1] "Most so-called 'nervous dyspepsias' are merely symptoms of neurasthenia. Recent work on the effect of various emotions on the gastric-intestinal tract has led

cramping—in his stomach. The pains, however, are not usually confined to his abdomen. He has them over his entire body, now here and now there. They are distressing and distracting, it is true, but they never approach the unbearable. Such pains are clear proof to him of his serious organic state. Although a careful physiological examination fails to reveal any true organic disturbance, he may, nevertheless, persist in his claims of bodily ills and organic weaknesses. The examining physician made a wrong diagnosis. He is really sick.

A number of factors contribute to a neurasthenic condition. It is recognized that at times great physical fatigue induced through overwork may be the immediate occasion of this state. But this is true only in rare cases. We must recognize that the hardest workers are seldom found in the ranks of the neurasthenic. This is true both for men and women. White, for instance, is strongly inclined to believe that, on the whole, not overwork but underwork is a significant causal factor in this disease. Writing of the life of that type of modern woman who is most subject to neurasthenia, he remarks:

> It is a life, however, that does not satisfy. In addition to its uselessness it becomes a life of longing for something usually indefinable, a life of shattered hopes, of ambitious longings that don't come true of fulfillment. Having no outer interests the thoughts naturally turn to self and in this factor is laid the foundation of the hypochondria that these patients suffer from, the eternal complaining of little nothings. Having lost their touch with reality and become self-centered their own ego occupies a too prominent place in their perspective. Their world is a world in which they occupy the central point, everything has some relation to them, they become suspicious, carping critics, gossips and scandal mongers. To try and escape from this inner suffering they often engage in a delirious round of social functions and break down apparently from overexertion in keeping up their social duties. This is, however, only the obvious cause; the real cause lies much deeper. Being somewhat physically tried, having failed, having no real interest, they are indifferent to all except their personal sufferings (*23*, 266).

Some greatly exhausting physical disease may also do its share. It may be that continued worry over possible failure in school or in business may serve to establish a neurasthenic condition. Partly through such worry and partly through conflict, the individual breaks down. The part played by conflict, which is probably the most important single condition, is strikingly shown in the following account by Pressey of a neurasthenic girl. It is such an excellent case that we cite it in full.

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us to believe that many of these 'nervous dyspepsias' are purely mental in origin" (*6*, 380).

Name: Mary S. *Age*: 19. *Sex*: Female. *Birthplace*: Ohio. Single. *Sources of Information*: girl's story, father, stepmother, a friend, the family doctor.

I. History of the Family.

A. Medical—Mother died at child's birth. Mother's family all rheumatic.

B. Social—Following mother's death, father drank and gambled. After ten years he married again. Since then the family has been divided, the father and daughter against the stepmother and her daughter.

C. Educational—Mother and father high school graduates.

D. Economic—Uncle, professor in university. Father owns best dry goods store in town.

II. History of the Individual.

A. Medical—Has always had poor digestion.

B. Social—Up to ten years of age, seemed to have the normal number of friends in school. Since arrival of stepmother, her home has been too unpleasant to ask friends to visit her, so she has lost most of her friends.

C. Educational—Finished second year of high school.

D. Economic—Taught a country school for a year. Since then has helped her father as an extra clerk in his store.

III. History of the Present Crisis.

A. Medical—After father's remarriage she began to complain of headaches and backaches and stomach trouble. The difficulties seemingly increased until she was unable to do any work and became confined to her room and then to her bed. But as she got scant attention from her stepmother, it was sometimes necessary for her to go down to the kitchen to get something to eat. She was always able to do anything like this that she desired.

B. Social—When teaching she became acquainted with a young man in the country, who sometimes came to see her on week ends, but as she was always so tired that she couldn't get out and walk or ride much, and her stepmother made it disagreeable and impossible for them to have any privacy in the house, he soon ceased coming. She made a few friends when she taught in the country and when she worked in her father's store, but they did not care enough about her to come to see her, especially after she became bedridden. Two of the most noticeable characteristics of the girl were her loathsome feeling

towards cats and her bitter hatred of her stepsister, whom she could not bear the sight of. Her stepsister was having all the advantages that her stepmother could give her.

C. Educational—None.

D. Economic—Spent her time doing nothing or reading "Snappy Stories," and similar literature. But every day she wrote many pages in her diary. This she kept locked in her desk and allowed no one to read. She has been so ill that she could not do any work.

IV. Present Condition.

A. Physical.

Is exhausted; has indigestion and constipation, no appetite. Is without energy or vitality. Seems too weak to get out of bed. No special defects.

B. Appearance and Behavior—Lies in bed dressed in very expensive robes and wants everyone to wait on her. Cries very easily. Reads a little, but for the most part lies still.

C. Intellectual Condition.

General Level—I. Q. of 90.

Special Functional Disorders—Judgment is very much preoccupied with her emotional life and her physical symptoms. Her mind seems entirely centered on her tiredness. Attention—cannot concentrate. Says she is always "too tired" and not interested in anything. Memory—normal. Association—normal. Intake—normal.

D. Emotional Condition.

General Emotional Tone—Childish, fretful, unstable, and irritable.

Special Emotional Trends—Extreme jealousy of stepsister.

Emotional Conflicts—Is evidently unable to compete with stepsister who is more alert and capable than patient. There is every evidence of conflict over this home condition. The patient seems to have resolved the conflict by starting competition for attention along an entirely different track (appeal for sympathy, through illness), since she has not been successful in any other way. Is withdrawing from reality after finding herself incapable of environmental adaptation.

V. Summary and Conclusions.

A. Summary—Headaches, dizziness, exhaustion, stomach trouble, constipation, family dissension, jealousy of stepsister, economic inefficiency, emotional preoccupation, emotional con-

flict with resulting withdrawal from reality, weak attention, marked lack of energy or ambition.

B. Conclusion—Neurasthenia.

PSYCHASTHENIA (COMPULSION NEUROSIS)

This form of the psychoneuroses is more serious than neurasthenia, if we take as our criterion the ability of the individual to maintain himself in his environment. There is a more extensive disturbance of the psychological functions than is true of neurasthenic disorders. Psychasthenic individuals have obsessions but, inasmuch as they are able to recognize the apparent absurdity of their obsessions, they are not completely hopeless. They also have very strong impulses (compulsions) to act in certain ways, but they are conscious of these urges. Moreover, they have strong phobias accompanied perhaps by sweating, trembling, palpitation of the heart, and pallor, but they are usually able to carry on. Again, they may feel incapable of performing even the simpler tasks, but they never become paralyzed. They show numerous doubts about a great many matters, a striking degree of indecision in simple cases involving judgment and choice and, at times, a very strong sense of unreality. Of such psychasthenic individuals Janet remarks that "it is a striking trait of their character that they never have any symptom in its completeness."

In psychasthenia, there are strong obsessions. By this we mean that individuals repeatedly experience essentially the same thoughts about a particular object or situation, although they earnestly strive to put all thoughts about such topics out of their heads. But the thoughts are peculiarly persistent. They come again and again. Psychasthenic individuals have here, in a somewhat exaggerated state, what every person has experienced in the form of recurrent melodies—some tune that deliberately thrusts itself into the stream of thought under various circumstances, no one of which holds even the remotest association with the bit of melody.

We wish to give the following illustrations of some obsessions in three college students in the hope that they will serve to make the nature of such "recurrent ideas" a little clearer.

I have had and still have a fixed idea that causes me any amount of discomfort. I don't remember ever being seriously injured with a knife wherefore I should feel great fear toward one. I can't imagine where I ever developed such a feeling of perfect terror for that object. The thought of it comes at most inopportune times when there is no occasion at all for its appearance. I can be talking on an apparently interesting topic of conversation when all

at once without any warning, whatever, I shudder as I feel the blade of a knife hurting me. I know it is ridiculous to imagine that I am being cut, but I cannot help being frightened. The knife seems to wound me in various places at different times. . . . For three years whenever I allowed myself to be idle I was obscessed by the idea that I saw a large roll of carpet which rolled or unrolled itself eternally. As for recurrent words, I have a habit while dreaming of different things of breaking in on my reflections with the words, "and then" or "and after that." The idea of the coolness of the grass is the one which comes to me most often when fatigued. . . . When fatigued I always picture vast horizons with a single occupant—as for instance, a single ship upon a large sea, or a vast desert in the middle of which is a single tent—outside, a camel and then a lonely Arab on his knees toward Mecca. . . . (3, 21f).

There are two symptoms that are put by some (see Coriat) as peculiarly characteristic of psychasthenia. They are the feeling of unreality and a sense of depersonalization. The former may concern either the environment or the individual's own personality. The individual may perceive either the environment or himself as being unreal. When the personality is involved in this manner, a strong feeling of depersonalization enters. The person is not himself. In extreme cases, the identity of the individual may drop completely away. A person is left, stripped of personal references and knowledge of himself. To illustrate this form of psychasthenic disturbance we give the following reports.

I can't form a mind picture of where I live. I am all alone in my mind. Things change every day. The looks of my house and the street seem to change every day. It seems as if I lived long ago, as if I did everything before. It is all past, there is no present and no future. I am not conscious of sleep. I just open my eyes. I don't know who I am,—I've lost my identity. My mind is all gone, it seems as if there was nothing there. The *feel* of things is unnatural. I look at my body and wonder if it is mine, and I wonder if my mind is in my body. . . . It is not I who feel, it is not I who eat, it is not I who speak, it is not I who suffer, it is not I who sleep; I am dead, and it is not I who see clearly" (5, 362, 24).

Coriat points out that psychasthenic disturbances occur more frequently in the introverted type of person. The individual whose history shows a timid and retiring nature—one inclined to phantasy or day dreaming—is more likely to become psychasthenic than the individual who is more extroverted. The cause is found in a greater tendency on the part of the former to suffer more seriously from conflicts. The occasion of a breakdown in such cases is usually marked by some emotional crisis in which there is conflict followed in turn by the repression of some wish.

The obsessions, the phobias, and the compulsions of psychasthenia represent, generally, the expression of a complex which is partially repressed. The knowledge of the source of trouble is fully held back, but the emotional effect is not. In the phobia, for instance, we find individuals suffering intense fear without the slightest degree of knowledge of the reason for their emotion. When the emotional energy is displaced or transferred to another object or situation, the necessary mechanism for the obsession and the compulsion is created. The individual may now have a phobia, a fixed idea or obsession, and a strong impulse to behave in a very particular manner. The mechanism of conflict, repression, and displacement, which we shall now consider, throws light upon the nature of the phobia, the obsession, and the compulsion.

An interesting case is reported by Brill of a patient who had the strange obsession that he was continually killing time. Although he might do any number of unlike tasks, there came again and again the disturbing thought that he was merely killing time. Under examination it developed that the man had previously thought about killing his father, who had a long white beard of the Father Time style, but had sternly repressed the thought. Now, instead of killing the father, it was a matter of killing time. The full emotional excitement attendant upon the thought of killing his father now came with the idea of killing time. The repressed complex continued to function, with the result that the idea of time came repeatedly into consciousness, and constituted, in this way, an obsession.

Let us consider this matter a bit further. By what means, let us ask, could we derive a phobia and a compulsive act from the original intent of the son to kill his father and so have all three—the obsession, the phobia, and the compulsion—related to the same earlier wish?

If we assume for purposes of illustration that the son meant to use a rifle to murder his father, we are then able to understand how the individual could develop a strong fear (phobia) of all rifles as a kind of defense mechanism. The emotion of *anger* tied to the repressed wish is now expressed as *fear* of the weapon intended for murderous use. The full intensity of the original emotion now comes with the perception of the gun. Each time the individual sees such a weapon he experiences the usual symptoms of fear: weakness, trembling, pallor, rapid beating of the heart, and sweating. The hatred has been converted into fear and attached to the gun. But under complete repression of the wish, he does not know why he is afraid of rifles and not, let us say, of revolvers and other guns. Moreover, he may experience a very strong compulsion or mania to destroy all guns. Here, again, he has no true notion as to

why he wishes to act in this way. In all these cases, the drive comes from the repressed wish with its emotional content. The particular direction which it takes in expression determines the obsession, the phobia, and the compulsion.

At no time, in such cases does the individual himself realize the source of his activities. His behavior is motivated along lines which permit him to continue. At the same time, they serve to defend him against possible dangers. It is better for the individual to go on this way, we may say, than to have a strong desire to kill his father, or to realize that he intended to kill his father, or actually to kill his father. This is, in a manner of speaking, the way of absolution. The individual's conscious past so far as it concerns some earlier, disturbing wish is wiped clean. He pays for the purging, however, in the form of fixed ideas, strange fears, and strong action tendencies.

The following discussion by Noyes of the mechanism involved in psychàsthenia should contribute, we believe, to your further understanding of this matter.

> The mental origin of the compulsion neurosis appears to rise from the substitution of an apparently meaningless but really symbolic idea for the highly emotional set of ideas repressed to form the complex. The real source of the emotional conflict thus remains disguised from the patient. The psychological mechanism may perhaps be best illustrated by considering the development of the phobia for dirt and the associated compulsive hand-washing. This irrepressible fear and the accompanying compulsive act constitute one of the most frequent forms of obsessional neurosis. The origin of the phobia dates to some past emotional experience connected with which the patient has painful ideas of self-reproach. The memory of this experience is unbearable and the emotion connected with it is therefore displaced or transferred to the idea of dirt which serves as a symbolic substitute for the original experience. Unconsciously the idea of dirt was chosen as a substitute as, like the original experience with its painful memories and its feelings of self-reproach, it symbolizes uncleanliness. Although transferred, the original emotion remains undiminished and renders the symbol (dirt) as intolerable as was the memory of the experience from which the emotion first arose. The patient feels, therefore, an irrepressible urge to free herself of this substitute so highly charged with emotion. No matter what material the hand-washing may remove the emotion remains, so the act must be repeated. This symbolic purification ceremonial may therefore be performed interminably (*17*, 181).

HYSTERIA

We have seen that the psychasthenic individual exhibits many partial symptoms—as Janet has remarked, no one is wholly complete;

that is, carried to the extreme. When these symptoms are carried to full completion, we have the manifestations of hysteria. This disease is, accordingly, the most serious of the various forms of psychoneuroses. In hysteria the symptoms are more numerous, and the disturbances of the psychological functions of the individual more extensive than they are either in neurasthenia or in psychasthenia.

In hysteria, we behold a personality that is profoundly diseased in a psychological sense. Hysteria cannot be described as a physical disturbance—a disorder of the nervous pathways or of the muscles and glands. On the contrary, it is essentially a disturbance of a functional character. "The manifold symptoms of hysteria," Coriat writes, "have no organic basis; such symptoms as paralysis, sudden losses of sensation, or sudden losses of the voice, blindness, convulsions, contractures, peculiar mental disturbances, being, when they occur in hysteria, purely functional in nature" (*6*, 299).

Man has long been acquainted with some of the symptoms of hysteria. Although he has not always recognized the fact, hysteria has played an important part in his religion, in his morals, in his superstitions, and in other aspects of his daily life. His religion, for example, has profited greatly in the past from the astonishing cures performed in its name. The blind have been given sight; the paralyzed have been made to walk; the deaf have been given hearing. Hysteria also touches his daily life by way of giving him curious aches and pains, which often are not severe enough to stop his work, yet are certainly strong enough to interfere seriously with his success. Moreover, hysteria repeatedly gives him many of the subtler symptoms of physical diseases and organ deformities. Both he and his physician may assume the existence of some malignant growth or some infected member as a source of some localized pain, when, in fact, the symptoms are purely hysterical. "Do not try to count," Janet said in an address during the inaugural ceremonies of the Harvard Medical School, "the number of arms cut off, of muscles of the neck incised for cricks, of bones broken for mere cramps, of bellies cut open for phantom tumours, and especially of women made barren for pretended ovarian tumours. Humanity ought indeed to do homage to Charcot for having prevented a greater depopulation. These things no doubt have decreased, but they are still done every day. Not long ago I saw a patient who had had an eye excised and the optic nerve cut out for mere neuropathic pains."

Most individuals tend to associate hysteria with hysterics. They use the latter term largely to mean fits of uncontrollable crying, screaming, giggling, laughing, and shouting as these occur in "normal" in-

dividuals. While hysteria is unquestionably involved in most such fits, the term means a great deal more. In fact, the usual disturbances commonly called hysterics, probably represent the milder forms of hysteria. They constitute, at least, the more obvious and less disturbing symptoms. While the fit of "hysterics" may last for hours, the fit of hysterical blindness may last for years.

The symptoms of hysteria are numerous and varied, and the degrees of variation shown by each is rather large. It is, therefore, no easy matter to secure a clear clinical picture of the disease. We shall try, however, to review the nature of the more outstanding symptoms of the disorder and the mechanisms which underlie them. It is understood, of course, that the many symptoms of hysteria are at the same time the manifold disturbances of the psychological functions. We find hysterical symptoms appearing particularly in such activities as action, perception, memory, and emotion.

Non-medical literature is replete with stories of cures effected in astounding ways. Individuals who have suffered with paralysis so severe that they have either lain utterly helpless in bed or gone on crutches for long periods have been cured in a few moments. Persons who have been unable to dress or feed themselves for years have been made whole overnight. A visit to some grotto, to the tomb of a saint, or to the sanctuary of a faith healer may restore lost functions almost in the twinkling of an eye. Where these stories are true, a hysteric personality may be looked for. In such cases the hysteric comes functionally paralyzed, blind, or anaesthetic to the tomb or to the faith healer, and finds a cure. Disorders of a hysterical nature include all the gross bodily movements as well as those involved in speech. A single member or the whole body may be helpless. Again, only the use of the vocal cords, the lips, and the tongue in the coördinated manner necessary for speech may be lacking. Contractures of such a nature that the members are held in one position for months or even years also occur in the hysteric. Finally, there are, at times, tics and compulsive actions of varying extent and intensity.

The hysteric person shows very pronounced disturbances of perception. Here we place all those cases of functional blindness and deafness, which are "miraculously" cured by visiting a shrine, by touching the bones of some saint, or by kissing the hand of a king. That persons may not be able to see in the sense that we usually mean the term and yet have nothing wrong with them, in the sense of structural lesions and losses, is universally recognized. The ordinary sleep-walker, for instance, does not see objects in a normal manner. During sleep-walking,

persons may act in ways which would bring deep shame or great fear to them under normal waking conditions. They may move easily around in the presence of others and yet remain unaware of their existence. They may move in dangerous places, perhaps with a degree of unconcern and ease impossible to them under waking conditions. They may actually avoid all dangerous objects and places, although they are fully asleep all the while.

Now, the hysterically blind individual, during his waking moments, may be able to see just as well as the sleep-walker does, yet remain firmly convinced that he is entirely blind. He may, in fact, become completely dependent upon others, or he may take up some occupation of the blind and eke out a meager living. In such cases, it is the very height of absurdity to say, as some of the grossly ignorant do, that the person has nothing wrong with him—that he is just pretending. The hysterical person no more pretends than does the sleep-walker. They are both psychologically abnormal.

In many hysterical cases vision may remain, but a great restriction of the visual field may occur. The field may be so narrowed that it is no larger than the visual field of a normal person as seen through a pin hole! The field of vision of the hysteric may actually be reduced from around 60 to 90 degrees to as low as 10 degrees. This fact serves fairly well to account for the fact that so frequently the hysteric (with vision) *seems* to be visually unaware of most of the events which occur about him. Yet he actually does "see" in the more peripheral regions of his eye, just as the wholly blind hysterical "sees." As evidence of this interesting fact, we cite the following from Janet.

Hystericals, who have an exceedingly small visual field, run without in the least troubling themselves about it. This is a curious fact to which I remember having attracted the attention of Charcot, who had not remarked it, and was very much surprised at it. I showed him two of our young patients playing very cleverly at ball in the courtyard of La Salpêtrière. Then, having brought them before him, I remarked to him that their visual field was reduced to a point, and I asked him whether he would be capable of playing at ball, if he had before each eye a card merely pierced with a small hole. It is one of the finest examples that can be shown of the persistence of subconscious sensations in hysteria. Besides, I had shortly afterwards the opportunity of making a still more precise experiment on the same point. A young boy had violent crises of terror caused by a fire, and it was enough to show him a small flame for the fit to begin again. Now his visual field was reduced to 5° and he seemed to see absolutely nothing outside of it. I showed that I could provoke his fit by merely making him fix his eyes on the central point of the perimeter and then approaching a lighted match to the eightieth degree (*10*, 198).

Other perceptual disturbances in hysteria are tactual anaesthesia and hyperaesthesia. The witches with their "devil's mark" were hysterical. They were apparently insensitive to the thin thrust of the needle or to the sharp probe of the knife. Yet other individuals assumed to suffer with the same sort of disorder have clearly shown that they truly feel. We have previously described the clever method used by Janet to determine whether a loss of tactual sensitivity was hysterical (psychological) or purely organic. In the former case, as we said, the person could be brought to report upon his tactual experiences. In the latter case, the individual remains unaware of the stimulation of the insensitive spots of his body. He no more feels such stimulation than does a man with a broken back when his foot, for instance, is stimulated. So far as sensitivity is concerned, the stimulated part in such organic cases is "dead." In most if not all cases, where the individual develops sensitive or insensitive regions, pains, and aches, and where the use of careful methods reveals no indication of structural disorder, hysteria may be properly assumed to exist.

Coriat reports the case of a woman who complained of a headache, fatigue, depression, inability to make up her mind to do things, and numbness, stiffness, and a decided weakness of the left hand. This latter she first noticed while attempting to put on a pair of gloves. An examination disclosed some physical signs of hysteria, such as diminished sensibility and muscular weakness of the left hand, and a limitation of the field of vision. It developed that her sister-in-law had died suddenly, some two months previously. At the funeral, the patient was much depressed and considerably overcome by emotion. On taking off her gloves that night, on her return from the funeral, she found that the left hand was numb and weak. Both the numbness and the weakness covered the exact area of the glove.

Amnesia is an outstanding symptom of hysteria. It is probably a universal symptom, if one considers memory, as do some, to include such abilities as seeing, moving, feeling, and the like. Thus any loss of such abilities is considered as a loss of memory. We shall, however, confine the meaning of the term to include only those experiences of an individual's earlier life which bear reference to his past. As a result of memory disturbance we find hysterical individuals showing periods during which they move about in a trance-like state. A *dissociated* part of the total personality, some would say, gets in the saddle, overrides the remainder, and produces a hysterical attack.

As an illustration of such hysterical seizures, we wish to cite a case of Janet's. We referred to this case in the previous chapter under the

topic of memory. It is the classical case of Iréne. Shortly following her mother's death the girl began to exhibit periods during which her behavior was quite strange. At other times her behavior was quite normal. Of the nature of the somnambulistic seizures Janet writes:

> The crises last for hours, and they show a splendid dramatic performance, for no actress could rehearse those lugubrious scenes with such perfection. The young girl has the singular habit of acting again all the events that took place at her mother's death, without forgetting the least detail. Sometimes she only speaks, relating all that happened with great volubility, putting questions and answers in turn, or asking questions only, and seeming to listen for the answer; sometimes she only sees the sight, looking with frightened face and staring on the various scenes, and acting according to what she sees. At other times, she combines all hallucinations, words, and acts, and seems to play a very singular drama. When, in her drama, death has taken place, she carries on the same idea, and makes everything ready for her own suicide. She discusses it aloud, seems to speak with her mother, to receive advice from her; she fancies she will try to be run over by a locomotive. That detail is also a recollection of a real event of her life. She fancies she is on the way, and stretches herself out on the floor of the room, waiting for death, with mingled dread and impatience. She poses, and wears on her face expressions really worthy of admiration, which remain fixed during several minutes. The train arrives before her staring eyes, she utters a terrible shriek, and falls back motionless, as if she were dead. She soon gets up and begins acting over again one of the preceding scenes. In fact, one of the characteristics of these somnambulisms is that they repeat themselves indefinitely. Not only the different attacks are always exactly alike, repeating the same movements, expressions, and words, but in the course of the same attack, when it has lasted a certain time, the same scene may be repeated again exactly in the same way five or ten times. At last, the agitation seems to wear out, the dream grows less clear, and, gradually or suddenly, according to the cases, the patient comes back to her normal consciousness, takes up her ordinary business, quite undisturbed by what has happened (*10*, 30).

One final illustration of amnesic disturbance must be considered here before we leave this topic. In sleep-walking and in somnambulism we have behavior essentially like that found in multiple personalities. For the time during which a person is in a state of somnambulism, a new personality is unquestionably in evidence. The "old" personality is gone; a new and perhaps unfamiliar one takes its place. The somnambulisms, the fugues, and the multiple personalities are, in reality, so closely related that we shall not attempt their separation. We wish to cite the following case of multiple personality to show the nature of the profound changes which may occur in an individual's personality

when just the one function (memory) becomes seriously impaired. This case of Prince's is excellently summarized by McDougall in the following manner:

The Beauchamp case involved, in addition to the normal personality (here called B), which existed before and after the long period of disorder, three distinct personalities called by Prince B 1, B 3, and B 4. B 3 was known also as Sally, and that name will be used here. It will conduce to clearness of this condensed statement if I describe first the personalities B 1 and B 4 and outline their history, leaving Sally for later description; but the reader must bear in mind that Sally complicated the picture throughout the history.

B was a nervous impressionable child, given to day-dreaming. Her parents' marriage was unhappy, and her mother was harsh and indifferent to her; but B, nevertheless, was strongly attached to her mother, and when the latter died B, who was thirteen years of age, suffered much emotional disturbance. During the following three years she lived under the care of her father, and suffered many shocks of a minor kind. At sixteen she ran away from her unhappy home. Two years later (*i.e.* when eighteen) B had become a nurse in a hospital and had formed a strong idealistic attachment to a young man, G. One evening G appeared unexpectedly under dramatic circumstances, and approached her in such a way that her very sensitive nature received a severe emotional shock. One might fairly infer from the account given that G kissed her. B remained much agitated and, in the course of the next few days, manifested a marked change of character. All her peculiarities became exaggerated. She became unstable and developed aboulia. She grew, too, abnormally religious. This shock initiated what may be called the second main period of the history.

This second period lasted six years, during which this new character continued to figure in her social circle as Miss B. In reality the new character was the personality B 1. She seems to have been formed by the exclusion, from the make-up of B, of certain character-elements which became the nucleus or foundation of the personality B 4. During these six years B 1 led an active life and became a college student; she was hampered by her poor health and the vagaries of Sally (to be described later). During these six years B 4 seems to have remained entirely latent. It was one year before the end of this period that the case came under the care of Prince.

A third period was initiated by another emotional shock related to that which had initiated the second period six years earlier. B 1 was much shaken; Dr. Prince was sent for and a sudden change took place in his presence. Much study was required to elucidate this change; the main facts only can be stated here. B 1 disappeared or became latent, giving place to B 4. This personality, B 4 which manifested herself at this moment for the first time, had no recollection of the events of the past six years, during which she had been latent. She could recollect the events of Miss B's life up to the time of the shock which initiated the second period (shock 1); these events seemed to her to be her

own remembered experiences; she took up conscious existence anew from this point of time (shock 2), as though the six years had not been. She thus had, in common with B 1, command of all memories up to the time of the first shock; but she was not identical with the B who suffered that shock. Just as B 1 differed from B in character, while retaining the memories of B, so also B 4 commanded the memories of B, but differed in character from B and also from B 1.

For nearly one year (the fourth period) B 1 and B 4 led the life of alternating personalities with reciprocal amnesia; and careful study of them during this time showed that they were complementary characters, each having command of the memories of the first period and of the memories of her own phases of dominance in the third period; while B 1 commanded also the memories of the second period. B 1 was a humble, weakly invalid, very suggestible, shy, retiring, studious, religious, always submissive, patient, amiable and altruistic, considerate of others and fond of children and old people. B 4 was very self-assertive, given to quick and violent anger, intolerant and quarrelsome, vain, sociable, irreligious, disliking children and old people. There were corresponding differences in tastes. Both were very emotional, but, whereas B 1 was wholly swayed by her emotions, B 4 fought them down. B 1 was easily tired and relatively inactive, though studious. B 4 was energetic and fond of bodily activity; she disliked most of the things that B 1 liked.

A fifth period was initiated by inducing deep hypnosis, when a personality appeared which commanded all the memories of both B 1 and B 4 and seemed to be, in respect of character also, a fusion of the two personalities B 1 and B 4. She had lost the reserve, the depression, the emotionality, and the idealism of B 1; but she had lost also the quick temper, the lack of faith, the resentment, and the egoism of B 4. She was a person of even temperament, frank and open in address—one who seemed to be natural and simple in her modes of thought and manner. Yet she more closely resembled B 1, and might fairly be regarded as B 1 restored to a condition of healthy-mindedness. This personality, who seemed to be, and is regarded by Prince as being, essentially the normal personality B, restored to wholeness by synthesis of B 1 and B 4, her two halves, could not at first be maintained, owing in the main to the opposition of Sally and B 4. There were frequent alternations of B with B 1 and B 4. During this period both B 1 and B 4 were amnesic for B's phases; but B commanded the memories of the B 1 and B 4 phases. There occurred some give and take of knowledge and memories between B 1 and B 4, and perhaps of character-constituents; what was lost by the one being gained by the other. It was not until after the lapse of some years that this fifth period was terminated by the enduring dominance of the healthy, normal B.

The case, so far as described above was, then, one of alternating complementary personalities, B 1 and B 4, with reciprocal amnesia. It remains to add to the picture the history of Sally.

Sally was an impish, childish personality and showed remarkable consistency, without any clear indications of increasing maturity throughout the

several (some six) years of her active career. Her existence was discovered by Prince shortly after the case came under his care, *i.e.* early in the last year of the six-year second period. She manifested herself when B 1 was in hypnosis, speaking of B 1 as "she" and of herself as "I," and claiming to a personality as entirely distinct from B 1 as was possible under the circumstances, the circumstances, namely, that they inhabited and made use of the same bodily organism. The subsequent course of events went far to substantiate this claim. The new personality at first was nameless; but soon she spontaneously adopted the name Sally Beauchamp.

It must not be assumed that Sally was merely the hypnotic state of B 1. Prince brings out very clearly the fact that the hypnotic state of B 1 (which was called B 2) was very different from Sally, was in fact, as is usually the case, manifestly the normal personality in hypnosis; whereas Sally was extremely different; and sudden changes in hypnosis from B 2 to Sally, and back again, produced startling contrasts. There was not only extreme difference of character between Sally, on the one hand, and B 1 and B 2 on the other; there was also difference of memory and knowledge. This difference cannot be described by saying that the memory of either personality was more extensive or inclusive than that of the other. Sally claimed that, between the times of her appearance in hypnosis, she led a subconscious or coconscious existence; and that, during these periods of submerged existence, she could, if she so wished (and frequently she did so wish) know and afterwards remember what went on in the mind of B 1; but that at times, as when, for example, B 1 read books uninteresting to Sally, she (Sally) would pay no attention and would occupy herself with her own thoughts. Sally claimed not only to be entirely distinct from and independent of B 1, but also to dislike and despise her; and she manifested this attitude and supported her claims by forcing certain sensory and motor automatisms upon B 1, namely, visual hallucinations and impulsions to automatic speech and other actions, impulsions which B 1 found herself unable to resist, even when they led to actions that were very repugnant to her, such as telling lies.

Among these automatic actions was rubbing of the closed eyes, frequently repeated. This seemed to be an endeavour on Sally's part to get her eyes open. Hitherto, when Sally had been dominant, her eyes had always been closed. After many attempts the manœuvre succeeded at a moment when B 1 was drowsily resting, and Sally for the first time was able to see and to dominate practically the whole organism. From this time on Sally frequently alternated with B 1, not only in hypnosis as previously but at other times also; and, during the phases of dominance of B 1, Sally gave much evidence of continued existence as a coconscious personality. Sally could not always exclude B 1 and secure dominance at will; but she was able to achieve this when B 1 was tired or more "run down" than usual; and she monopolised the organism for considerable periods during which B 1 seemed entirely latent, and of which B 1 had no direct knowledge or memory. During this time Sally's activities largely took the form of teasing and hazing B 1, by writing to her impudent

messages and playing upon her elaborate practical jokes; *e.g.* on one occasion Sally, while dominant, unravelled B 1's knitting and wound the thread all over the furniture of her room. Sally also during her subconscious phases would force inhibitions and automatisms upon the dominant B 1, much to the latter's annoyance. There was thus a struggle of two wills. Such scenes as this were the outcome of a contest of wills, of Sally's will against Miss Beauchamp's will. . . . In these contests Sally usually won, and Miss Beauchamp's will (that of B 1) would be paralysed. The latter would not only find herself unable to will to do what she wished, but often was actually compelled to do something she did not wish to do.

Sally did not command all the accomplishments of the highly educated B 1; for example, she could not read French, a fact explained by her lack of interest in the more serious reading of B 1.

Prince summarises the relations between B 1 and Sally as follows: "Sally is a distinct personality in the sense of having a character, trains of thought, memories, perceptions, acquisitions, and mental acquirements, different from those of B 1. Secondly, she is an alternating personality in that during the times when the primary self has vanished, Sally is for the time being the whole conscious personality, having taken the place of the other. . . . At such times B 1 does not become a subconsciousness to Sally but as a personality is wiped out (or rather, is latent). Thirdly, Sally does not simply alternate with B 1. There are times when Sally manifests herself as an extra-consciousness, concomitant with the primary personality B 1." The only incompleteness of Sally during her periods of dominance was a rare form of anaesthesia, namely, complete anaesthesia of the skin senses and of the "muscular sense" when her eyes were closed, and a general and continued anaesthesia of the deep tissues.

After the appearance of B 4, Sally continued her pranks, but the conflict became more serious; because B 4, as soon as she learned of Sally's existence and nature, made a sustained effort to get the better of Sally and to suppress her. Like B 1, the new personality B 4 knew nothing directly of Sally or of the events of Sally's phases of dominance. Sally had not the power of sharing or reading the thoughts of B 4, as she read those of B 1; but she could and did force upon B 4 some inhibitions and automatisms; though less successfully than in the case of B 1, because B 4 resisted and fought against such influences from the coconscious Sally.

At this time Sally wrote her autobiography, claiming to remember her own existence as a subconscious and coconscious personality from the time when the child B began to walk, and to have had even at that time tastes and points of view very different from B's.

Towards the end of the fifth period, Sally, who had fought for her life valiantly and successfully, began to show signs of discouragement, under the combined efforts to suppress her of B 4 and of Dr. Prince. She described herself as feeling "squeezed" during her subconscious phases. When the

normal personality was restored as a stable synthesis of B 1 and B 4, Sally seemed to be deprived of her power, both her power of controlling the primary personality by inhibiting her actions or forcing upon her "automatic" actions and hallucinations, and also her power to secure dominance of the organism. Prince frequently refers to Sally as a group of conscious states or ideas split off from the main personality and synthesised to form a secondary personality; and in several passages he writes of the restored personality in terms which imply that Sally was included in the synthesis. But, whatever Sally's nature and origin, it must be insisted that Prince's account does not justify the view that Sally was in any sense synthesised with or incorporated into the restored personality B. He has told us that he had found it "easy to amalgamate by suggestion the dissociated experiences of B 1 with those of B 4, so that they were remembered, but impossible to amalgamate Sally's with either." And he repeatedly states that the synthesis of B 1 with B 4 produced the normal whole personality B, while Sally became at such times "squeezed." Further, the restored personality did not command memories of the events of the phases of Sally's dominance. We are told "the real Miss Beauchamp is disintegrated into personalities B 1 and B 4, who, conversely, may be synthesised into real B." Further—"the resurrection of the real Miss B is through the death of Sally. . . . Of Sally, her life and her doings, she (the restored B) knows nothing, except indirectly. Of this part of her mental life she has no more memory than has B 1 or B 4." And of Sally we are told: "With the resurrection of the real self, she 'goes back to where she came from,' imprisoned, 'squeezed,' unable either to 'come' at will or to be brought at command. Automatic writing, speech, and such phenomena cease, and it has not been possible as yet to communicate with her, and determine what part if any she plays in Miss Beauchamp's subconsciousness, or whether as a subpersonality she exists at all. When, however, as a result of some mental catastrophe, she appeared again as an alternating personality, her language implied a persistent existence as a subconsciousness like that of her early youth, and as described in the autobiography" (*14*, 497).

In hysterical individuals there is usually a greater degree of *emotional instability* than is found among normal persons. Such disturbed persons are often referred to as being ready to break into tears at the least unkind word. They are easily depressed, but they may recover in an astonishingly short time. Frequently, when thwarted, they may drop into a frenzy of rage. Their bodies may jerk badly, and their faces may twitch violently. They may throw themselves on the floor to kick, scream, bite, and tear. They may laugh and cry at the same time or alternately until fatigue brings them relief. The quick terror and the haggard, worried appearance of some hystericals point clearly, at times, to emotional unstability.

There remains one symptom to discuss. It is suggestibility. The

hysterical person, according to Babinski and others, is peculiarly suggestible. Because of this trait he tends without thinking to function upon hearing or seeing some statement, some description; or upon seeing some posture or behavior in another. The hysteric tends especially to function in accordance with the ways of others. He may become insensitive, he may develop paralysis or contractures, or he may merely "go to excesses"—if others do. The camp-meeting orgies, in which some worshiper, who starts to "tree-the-devil" by getting down on his hands and knees around some stump or tree and barking like a dog, is shortly surrounded by a group of barking, growling, and howling hysterics, show how far suggestibility will go with religious hystericals. Again, the fact that a person may develop the symptoms of some physical disorder upon seeing them in another makes clear the profound influence of suggestibility. No doubt, many "witches" indirectly owed their death to their suggestibility. They probably heard that witches had insensitive spots upon their bodies, and they promptly proceeded to develop such spots. It is generally conceded that through suggestion in hypnosis, the usual symptoms of hysteria—amnesia, anaesthesia, emotional disturbances, and paralysis—can be produced in a "normal" individual.

Various explanations have been offered to account for the symptoms of hysteria which we have just reviewed. Babinski puts his account, as we have just seen, in terms of suggestibility. Janet saw hysteria as a breakdown in the *integrated* or *synthetic* patterns of the personality. A part "crumbles away" to give the *dissociated* self. The paralyses, the anaesthesias, the tics, the contractures, the unrecallable memories, Janet explains as being forms of dissociation. In each case a particular set of abilities has been cut off. When the dissociated part usurps control and pushes the remainder of the personality out, we have somnambulism or multiple personality. This is indeed a very sensible way of regarding the facts. Two weaknesses, however, are evident: (1) Why should the dissociated fact ever assume control and so produce the terrific personality upheavals, and (2) why should the symptoms take one form rather than another; that is, why should a paralysis, for instance, develop instead of an anaesthesia? These are difficult questions to answer.

Freud maintains that dissociation is conditioned by conflict with repression of those wishes which cannot well be expressed because they are incompatible with the moral standards of the individual. Hysteria is a way of satisfying a desire which cannot be directly permitted expression. The repressed complex carries its emotional drive with it

into the unconscious, where, in a disguised form, it operates upon the personality of the individual.

The energy of the emotional drive, attached to complex, comes to expression in the form of a physical symptom which satisfies the previous wish, although the true source of the symptom may still remain hidden. The expression of the repressed wish during *waking* periods produces the dream-like *ideational* disturbance known as the somnambulism, which we illustrated by the case of Irène, and the *motor* and the *perceptual* disturbances of a paralytic and anaesthetic nature, which we have illustrated from time to time.

The particular *form* of disturbance (paralysis, blindness, deafness, or pain) is determined by the original wish. The disease is a symbolic expression of the original conditions that gave rise to the conflict. In case of the soldier who wished to be removed from danger, blindness ensued. In case of Lady Macbeth, who wished to be free of the guilt, hand-washing appeared. This particular mechanism by means of which a wish is expressed in the form of a symptom (paralysis, blindness, pains, loss of memory, *etc.*) is known in Freudian terminology as conversion. The desire is converted, we say, into a symptom and in this way secures indirect expression. At the same time it constitutes a disease symptom.

BIBLIOGRAPHY

1. Adler, A., *A Study of Organ Inferiority and Its Psychical Compensation.* 1917.
2. Babinski, J., "My Conception of Hysteria and Hypnotism." *Alienist and Neurologist,* 1908, *29,* 1.
3. Berry, C., "Obsessions of Normal Minds," *Jour. of Abn. Psychol.,* 1916, *11,* 19.
4. Brill, A., "Psychoanalytic Fragments from a Day's Work," *Jour. of Abn. Psychol.,* 1913, *8,* 310.
5. Brown, W., *Psychology and Psychotherapy.* 1921.
6. Coriat, I., *Abnormal Psychology.* 1914.
7. Diller, T., "The Question of Hysterical Analgesia and the Theory of Babinski, *Jour. of Abn. Psychol.,* 1920, *15,* 55.
8. Fox, C., *Psychopathology of Hysteria.* 1913.
9. Frink, H., *Morbid Fears and Compulsions.* 1921.
10. Janet, P., *The Major Symptoms of Hysteria.* 1907.
11. ————, "A Symposium on the Subconscious," *Jour. of Abn. Psychol.,* 1907, *2,* 60.
12. MacCurdy, J., "War Neuroses," *Psychiatric Bull.,* 1917, *2,* 243.
13. Mayer, E., "A Dissociated Personality. With an Analysis of Its Psychological Problems," *Amer. Jour. of Insanity,* 1920, *76,* 465.
14. McDougall, W., *Outline of Abnormal Psychology.* 1926.
15. Mosso, A., *Fear.*

16. Myerson, A., *The Psychology of Mental Disorders.* 1927.
17. Noyes, A., *A Textbook of Psychiatry.* 1927.
18. Pressey, S., *Mental Abnormality and Deficiency.* 1926.
19. Prince, M., Miss Beauchamp, "The Theory of the Psychogenesis of Multiple Personality," *Jour. of Abn. Psychol.*, 1920, *15*, 67.
20. Stoddart, W., *Mind and Its Disorders.*
21. Strecker, W., "Experiences in the Immediate Treatment of War Neuroses," *Amer. Jour. of Insanity*, 1919, *76*, 45.
22. Taylor, W., *Readings in Abnormal Psychology and Mental Hygiene.* 1926.
23. White, W., *Outlines of Psychiatry.* 1921.
24. Wilson, S., "Some Modern French Conceptions of Hysteria, *Brain*, 1911, *33*, 293.
25. Wolfsohn, J., "Predisposing Factors of War Psychoneuroses," *Jour. of Amer. Medical Asso.*, 1918, *70*, 303.

CHAPTER XVII

THE PSYCHOSES

The psychoses are psychological diseases of a major sort. They constitute, so to speak, the true insanities. The population of our institutions for the mentally disturbed consists chiefly of these types. Many individuals who suffer with some forms of these mental diseases are wholly incapable of maintaining themselves in a social and economic sense. If it were not for society, they would surely meet death either through starvation or in some more violent form. Moreover, they frequently exhibit behavior toward others of a very harmful sort. As we have previously remarked in the chapter on law, the insane may be guilty of very serious crimes. In this last respect, psychotic individuals differ, as a large class, from the psychoneurotic. Among the latter, harmful behavior may appear, it is true, but it is unquestionably more infrequent than among the former. Psychotic disturbances show many symptoms. Such disturbances are more serious than those of the psychoneurotic. In these major diseases, hallucinations and delusions appear, profound emotional disturbances develop, and permanent and extreme losses of an intellectual sort occur.

We divide the types of psychoses which we shall consider here into the functional and the organic. As we have said before, this division is rather superficial. It is drawn in terms of the assumed contributions of the mind and the body to these diseases. In the functional disturbances, there are no discoverable weaknesses or inadequacies in the organism on its bodily side. In the organic, however, the stresses and the strains which commonly come with increased age and microbic attack are evident in the human frame. The brain may slowly soften with age, or it may be ravaged by pathogenic or toxic agents. Under such destruction the personality of the individual is forever changed. At times, it is true, the course of the disease may be stayed, but the damage done is irreparable. We wish to consider rather hurriedly these two large "groups" of disorders: the functional and the organic.

FUNCTIONAL PSYCHOSES

There is a great trio of functional psychoses. Under the head of the manic-depressive, schizophrenic, and paranoiac forms go those disturb-

ances of the most serious nature for which no bodily foundation has yet been discovered. These are the diseases which apparently develop out of the temperament of the individual. And they show, in a very striking manner, the final (most serious) results of a bad conflictory history. These three diseases represent the individual's attempts to solve his struggles; to resolve his conflicts. But they are solutions which have been dearly purchased. They have cost the individual his sanity. We shall consider these three diseases in the following order: paranoiac psychoses, schizophrenic psychoses, and manic-depressive psychoses.

Paranoia. Paranoia is the least common of the functional psychoses. Only a small number of true paranoiacs are numbered among the first admissions to institutions for the abnormal.[1] A larger number is assumed to exist outside such institutions.[2] They constitute the cranks, the persons who write many letters to officials complaining about petty matters, the persons who pester the patent offices with alleged inventions, the persons who are full of curious ways of producing desired social and economic reform, and so on. Occasionally, an individual of this sort who becomes too troublesome or too dangerous to be permitted further social freedom is institutionalized.

There is one outstanding symptom of paranoia. It is the delusion. The ability of an individual with this disorder to think straight about a particular topic usually becomes so impaired that it is impossible for him to weigh facts in a normal manner. He is so strongly biased or prejudiced that he is wholly unable to see both sides of a matter. As we have previously remarked, if very good reasons upon some topic,

[1] May furnishes us some statistics upon the number of paranoid cases among the first admissions. "During 1918 and 1919 there were 13,588 admissions to the thirteen New York state hospitals. Two hundred and fifty-six, or 1.88 per cent of these were cases of paranoia or paranoid conditions. During a period of eight years there were 49,640 admissions of which 1,240, or 2.5 per cent were paranoid conditions. In Massachusetts sixty-four, or 2.12 per cent, of the 3,011 admissions during 1919 were reported as paranoid conditions. In twenty-one hospitals in other states there were 18,336 admissions. Of these, 789 or 4.3 per cent, were paranoid conditions" (*14*, 474).

[2] "There are doubtless many paranoiacs at large who never have and perhaps may never cross the threshold of a hospital and so be recorded for what they are. If the delusions are relatively harmless no protest is made and they continue at large. They are known in their communities as 'mildly cracked,' a 'little bit off,' or as 'monomaniacs.' Some of them are very harmless indeed, their activities merely causing a smile of pity in those who know. Some of them have a little money to spend and regularly flood the mails with mimeographed, sometimes printed, expressions of their wholly worthless opinions on anything and everything. Such are many faddists and cranks. Some are more active and are chronically anti-this or anti-that or ardently pro-the-other-thing. While they are relatively harmless they nevertheless cost society much unnecessary disturbance" (*4*, 72).

about which an individual holds delusions, are presented to the person, he either ignores them or twists them so that they fit into his system. It is in this sense that paranoia is considered as a disease of thinking. Thinking is simply distorted to serve the ends or purposes of the individual. It does not mean, however, that individuals cannot think about other topics. On other subjects, as well as in other functions, the individual may be normal. Kraepelin speaks of this disease as an "immovable delusional system that is accompanied by a complete retention of clearness and order in thinking."

Delusions in true paranoia are systematized. Each part seems to hinge nicely to every other part. There are always very good reasons for each particular action, related in any manner to the delusory system. The delusion of the paranoiac is not detached from behavior. On the contrary, it is intimately related to behavior: it regulates and orders the life of the individual. A wealthy man through the delusion that he is ruined may file a petition in bankruptcy or sell his holdings at absurdly low prices; a religious paranoiac may believe he is the Messiah and set out to convert the world. A poor man suffering with paranoia may buy a large amount of merchandise on credit which he then sells or gives away under the impression that it belongs to him. A deluded person may think that he is the state executioner and proceed to kill as many persons as he can before he is apprehended; he may believe he is a criminal, surrender to the police, and insist upon being punished; he may believe he has committed some grievous sin and in atonement mutilate himself horribly. In every case, the delusion finds expression in behavior. There are, however, paranoid forms of other diseases in which delusions occur, but in which there may be no connection between the delusion and action. A paranoid personality may lay claim to greatness or may describe the way in which he is being persecuted apparently without being behaviorally affected in the least by his delusion. But such cases as these do not belong to paranoia.

The systematized delusions of the paranoiac are of two sorts; namely, persecution and grandeur. These take many forms. We find, among a great many others, delusions pertaining to health, to sex, to religion, to invention, and to law. Since we have previously discussed the nature of the delusion, we shall not dwell further upon the matter. As an illustration of the nature and the possible consequences of a delusory system we cite the following case of a homicidal paranoiac with delusions of persecution and grandeur.

During the night from the third to the fourth of September, 1913, the Headmaster Wagner, thirty-nine years old, murdered his four children and

his wife while they were sleeping; the following night he set fire to several houses in another village where he had previously been a teacher, and was shooting at the male inhabitants, of whom he killed nine and seriously wounded eleven. Even as a boy he was easily insulted, ambitious, conceited. Later he had poetic plans for reforming the universe. His sexuality in respect to the animal impulse was strong, but he had a "disinclination" toward marriage and evidently no parental instinct, even though he loved his children in an ordinary human way.

His highly developed self-esteem had been deeply depressed by a futile struggle of many years against onanism. Later (1901), under the influence of alcohol, he had let himself be carried away to sodomy, and then had a dreadful feeling of sin with incessant fear of contempt and arrest, which soon brought about delusions of reference and the conviction that the inhabitants of the village knew of his crime and spoke about it.

His accusations against himself he transferred to his family; all "Wagners" should be exterminated; then his hatred extended to all mankind, above all to the inhabitants of his district who had treated him badly. He condemned himself doubly, in part as a man unworthy of this life, but in part as a genius whom he honored as at least equal to the greatest poets, but whom he also ranked as equal and superior to Nero, and, on the other hand, compared with Christ. Transferred in 1902 to another place, he enjoyed relative quiet for six or seven years without, however, ever ceasing to build up further his delusional system. But then, according to his opinion, the remarks and contempt continued there also. The result was the plan even then developed in every detail, to murder his family as much because of reasons of race-hygiene as from pity, and then set fire to the village where he was first employed, and destroy it with all its hypocritical inhabitants. The first necessity was the extermination, the "redemption" of his children; but the revenge against, and contempt for, the village occupied him no less. His wife he had to kill because of pity. For a person like him there are special laws. He had not only the right but the duty to do this. His plan was a "humanitarian matter." For four years he postponed the execution of the bitter task. But when he was later transferred to a third locality and there felt himself the center of barroom gossip, he executed his plan systematically. In his feelings, as in his self-estimation, he was completely ambivalent: he could not witness the killing of a chicken, did not like to see blood generally. In the insane asylum also he was so soft during the visits of relatives that he denied them to himself, and with all this, he had made and also executed the bloodiest plans (*2*, 516).

It seems that persecutory and exalted delusions go hand in hand. The one seems necessary to the other. Bleuler, for instance, writes that "there is probably no paranoiac (and paranoia-like) delusion of greatness without delusions of persecution, and no delusion of persecution without ideas of greatness or at least aspiration to greatness" (*2*, 531). The

notion of grandeur explains the idea of persecution. The great, so the paranoiac may argue, are misunderstood and mistreated. He then reasons that he, too, must be great, because he is mistreated. The particular form which his delusion assumes appears to depend mainly upon his history. According to Krafft-Ebing, the person whose history shows a suspicious, retiring, solitary nature usually develops strong notions of persecution. The thoroughly conscientious, painstaking person becomes the religious paranoiac, and the rough, irritable, egotistical, and self-conscious person becomes the crank who starts lawsuits and complains about petty things to civic and governmental officials including even the President.

We assume here that delusory system of the paranoiac may be best considered as a striking example of the slow development of a defense mechanism, under conditions in which the individual suffers conflict and settles it by projection and compensation. As we have said, the personality which offers excellent soil for the paranoic delusions of middle or late life is suspicious, irritable, moody, conceited, self-conscious, resentful in the earlier years. With time, these traits appear to be exaggerated. The individual is usually unsuccessful and unhappy in his contacts with others; he broods upon his failures; he searches himself and the outside world again and again for the causes of his shortcomings. Since he cannot well admit his own weakness and inferiority, he interprets his troubles, his failures, his unhappiness as a result of the fault and the failure of others. People do not want to understand him; they refuse to appreciate his finer nature; they deliberately refuse to recognize his true potentialities. Thus he may be merely suspicious at first of the good intentions of his associates. He begins "to notice that people act differently towards him, when he goes in a room someone gets up and goes out, people on the street spit when they pass him, his employer has failed to say 'good-morning' to him lately, people who are standing about here and there are talking about him and speaking of his condition and making disparaging remarks" (*24*, 101).

But suspicion breeds certainty. He gradually arrives at the only conclusion possible for him: he is surely being persecuted. When he reaches this stage, he is well on the road of delusions. The delusions of grandeur may now enter. He finds in his own superiority sufficient explanation for the unjust attitude and behavior of others. The whole matter is simple: he is really more intelligent; he is more charming; he is more powerful than others. People are jealous, and in their jealousy, they mistreat him. The discovery of his own superiority may come through "chance" suggestion. It may come, however, through being

told by some voice (hallucination). Or, he may hit upon it through a careful and logical consideration of his case. He must be great, he argues, or many persons—officials and the like—would not bother with him. Out of the delusion of grandeur came the smugness, the stilted air, and the supercilious actions of many paranoiacs.

SCHIZOPHRENIA OR DEMENTIA PRAECOX

Schizophrenia[1] is a mental disease that occurs most frequently before middle life is reached. It may appear in the adolescent, or it may come in the individual past middle life. The following data upon the age of hospital admissions show that in more than 50% of the cases the individual is *past* twenty-five years of age.

Age Group	Percentage
Under 15 years	.2
15 to 19 "	7.8
20 to 24 "	20.1
25 to 29 "	22.0
30 to 34 "	16.6
35 to 39 "	13.5
40 to 44 "	8.4
45 to 49 "	5.3

They show that the disease is in no sense a strictly adolescent phenomenon as is sometimes claimed.

This psychosis is essentially a disease of the major portion of the whole personality—of the whole psychological organism. Unlike paranoia that touches mainly thinking and acting, this disease involves most if not all of the psychological functions. The behavioral eccentricities of schizophrenia are peculiarly interesting. The stereotyped movements, about which we earlier spoke, show up in this disorder. The "waxy" condition of the bodily members also appears here. Tics (facial) are rather common as well as bodily twitching. Compulsions are occasionally found—the individual may suddenly and without any apparent motive run or jump; or strike, kick, or murderously attack some person. Moreover, the individual may be very negativistic or contrary in his behavior. If told to do something, he does just the opposite. In order to secure desired action, it may be necessary always to command him *not* to act in the way that is really desired. He will then act in the opposite, and desired, manner. For example, if he is told to drink his milk, he flatly refuses; but if told not to drink it, he

[1] It approaches more nearly a condition of disrupted personality than it does true dementia or degeneration. It is better, therefore, to call it schizophrenia (meaning split-mind) than dementia praecox (precocious dementia).

immediately becomes ready for it. Emotional disturbances run throughout the disease.

In many cases the individual is peculiarly apathetic and unconcerned about all things about him. He cannot be aroused to any significant degree of interest in things. He may sit for the most part of each day of his life looking down at his hands, or staring far into space. When addressed, he may seldom answer. Occasionally, he may break forth to complain or to describe his feelings. Even when he is more active and talkative, he is apparently lacking in emotional drive. In general, he is indifferent, without pride, and ambitionless. Of this attitude White writes:

> A death, a birth, a marriage, the visit of a long absent relative, are all apprehended with the same lack of emotional expression. No matter how much pleasure or pain the event might be supposed to give, or would give in a normal person, the patient receives it with indifference, without surprise, without an expression of interest often, in the most matter of fact sort of way, as if such things were occurring hourly (*24*, 171).

In schizophrenia, disturbances in imagination appear. There may be a marked degree of incoherence as well as great sluggishness in the flow of ideas. Hallucinations and delusions also occur. The hallucinations are largely auditory and often of a threatening, scolding, commanding nature. The paranoid symptoms are generally unsystematic, persecutory, and fairly impermanent. While it may be true, as some claim, that intellectual deterioration occurs, it would seem that a certain degree of this interpretation is due to the schizophrene's lack of interest in everything about him. He seems really to care about nothing: he eats, sleeps, and, perhaps, does simple institutional tasks. Beyond that his outside interests end. Since it is almost impossible to break through his protective covering, it is, therefore, difficult to speak accurately of his deterioration. In many cases where contacts are effectively made, the individual seems to have a fairly clear mind. Neither memory nor thinking is seriously disrupted except in the extreme cases. That is to say, he is not apparently in a mental stupor—his mind is not "clouded."

Pure types of mental diseases are seldom found. Mixed symptoms are more often the rule. This is especially true in schizophrenic cases. Symptoms of the various types may occur simultaneously. But they may appear successively. During the earlier stages of the development of the disorder, the symptoms of one form may predominate, but during later stages, the characteristic manifestations of another form may appear. The most complete clinical pictures describe four major forms

of this disease. They are the *simple*, the *hebephrenic*, the *catatonic*, and the *paranoid*.

Simple Schizophrenia. In the *simple* form there are no clearly exaggerated symptoms. There are no delusions and no bizarre actional disturbances. The picture is essentially one of an individual who was formerly interested in the things of life, but who is now lacking, to a noticeable degree, in such interest. The schizophrenic person of this type is moody, retiring, and indifferent. He is both negligent in his personal habits, and derelict in his social duties and relations. In this stage he may become a drifter, a dependent upon the charity of others, or a criminal. In this connection Noyes remarks that "not a few of the occupants of jails and almshouses are really suffering from simple praecox" (*18*, 137). Or, he may remain within the family circle generally misunderstood and censored by his relatives for his gross negligence of others and his total lack of ambition. The troubles of the simple schizophrenic, then, are largely emotional in character. It is as if he had started to do something but, having lost his zest for the task, had let the matter drop in order to take a long rest. Perhaps the following illustration of an attack of simple schizophrenia will make clearer what we are trying to say. It is the case of a student.

This pupil pays no attention to his duties, which three-fourths of the time are left unfinished; he no longer takes the trouble of learning his lessons. In the classroom and at his studies he spends most of his time dreaming. It is evident that he cares nothing for his work. His professors no longer recognize in him the former studious pupil. It seems that even the approaching examinations do not affect his indifference. When it is pointed out to him that he is likely to fail, he promises vaguely to be more diligent, but one can see that he has no firm determination. The comments and suggestions in the letters of his parents no longer have any effect on him. . . . Formerly so jolly and so full of good humor, he has become quite unsociable. He does not seem to be pleased except when alone. When, by way of exception, he joins his comrades in conversation or in play, he soon leaves them, often after quarreling with them over some absurd trifle. . . . Lately he has been complaining of insomnia and headache. We have had the physician see him, but he has found nothing serious and has merely prescribed rest (*20*, 235).

Hebephrenia. The symptoms in this form usually appear more abruptly than in the simple type. There is a period (perhaps of several months) during which the individual exhibits insomnia, headache, depression, and lassitude. Then confusion, hallucinations, and delusions emerge. The individual is usually disoriented (confused), generally hears voices reviling or condemning him (hallucinations), or frequently

believes he has done some great, unpardonable wrong (delusion). His hallucinations are transitory, and his delusions are unsystematized. Judging from the facial expression and the general behavior, the delusions are often quite silly. It is in this form that we find the foolish "looks" and the silly laughter of the praecox.

Emotional indifference and apathy also occur here. The individual may describe the attempts of enemies to kill him, or he gives the details of how he was killed, without any show of excitement. There may be an occasional outburst of emotional activity, but such are rather rare. During these periods of heightened activity, a marked incoherence may appear in the individual's verbal associations. We wish to cite the following illustration of this apparently unrelated flow of ideas in the schizophrene:

"How old are you?" "Why, I am centuries old, sir." "How long have you been here?" "I have been now on this property on and off for a long time. I cannot say the exact time, because we are absorbed by the air at night, and they bring back people. They kill up everything; they can make you lie; they can talk through your throat." "Who is this?" "Why, the air?" "What is the name of this place?" "This place is called a star." "Who is the doctor in charge of your ward." "A body just like yours, sir. They can make you black and white. I say good morning, but he just comes through there. At first it was a colony. They said it was heaven. These buildings were not solid at the time, and I am positive this is the same place. They have others just like it. People die and all the microbes talk over there, and prestigitis you know is sending you from here to another world." "Do you know what year this is?" "Why, centuries ago." "Do you know who discovered America?" "Yes, sir; Columbus." "What year?" "1492; they have had several discoveries since then, sir." "When was the Civil War?" "That was in 1864–1860–1864." "Who was the President of the United States at that time?" "Well, let me see; they make you over again sir." "When did you enter the army?" "I entered the army, why it was centuries and centuries ago; not I but a body just like my remembrance around 1903." "Were you ever in Cuba?" "Yes, sir; I was there three times. That was centuries ago; not I but my remembrance, because I have been killed; yes, I have been killed, I am positive of that. Over there originally—originally means first—they remake us. There are other stars like this. I was sent by the government to the United States to Washington to some star, and they had a pretty nice country there. Now you have a body like a young man who says he is of the prestigitis." "Who was this prestigitis?" "Why, you are yourself. You can be a prestigitis. They make you say bad things; they can read you; they bring back Negroes from the dead" (*24*, 180).

Catatonia. We may characterize the hebephrenic form in terms

of apathy and dullness, and thus emphasize the emotional side of the individual. In the catatonic type, the outstanding disturbances are found in action; for here we find the fixed attitudes and stereotyped movements which we earlier described. The onset of this form of schizophrenia is relatively abrupt in most cases. The individual may become depressed and then after a time pass into a stupor. This is one side of the picture. In the other side, we find a state of varying degrees of depression, which is usually broken fairly suddenly by an attack of excitement. The first form is called catatonic stupor and the second, catatonic excitement.

The "stupor" which is characterized by apparent indifference to everything, by negativism, by stereotypy, and by heightened suggestibility is not really a true clouding of the mind or a loss of consciousness, as Rosanoff makes clear.

> As a matter of fact lucidity is but slightly if at all impaired in the catatonic. Impressions of the external world are perceived almost normally. Very frequently the patient, though seemingly unconscious of his surroundings, relates, after the stuporous attack has passed, with surprising precision the facts which would seem to have totally escaped his observation. In spite of appearances catatonic stupor is therefore not the result of an intellectual disorder proper, but, like catatonic excitement, of a disorder of the will (*20*, 238).

In negativism the individual may refuse food, may refuse to move when pricked deeply with a pin, may actually refuse expression, so far as he is able, to the bodily functions. If spoken to, he refuses to answer; if asked to move, he refuses. If an attendant tries to bend the patient's arm, he stiffens it, and so on. In stereotypy the individual may assume curious postures: "a squatting position, the elbows on the knees, the head drawn back." The face may be drawn into a permanent grin, or an enduring scowl. On the other hand, the individual may be placed in most curious bodily positions which he will continue to maintain (cataleptoid state). He may repeat everything that is said to him or in his presence. Here is the phenomenon of *echolalia* of the purest type. Or he may mimic the movements of those around him. If the attendant scratches his head, so does the patient; if the attendant coughs, so does the patient. Here is *echopraxia* in clearest form.

Opposed to the period of "stupor" is that of excitement—of motion without emotion. Here the individual is in constant activity. In extreme cases every part of his body appears to be involved. The actions may have no observable significance. They may occur apparently

in a random fashion, or they may constitute a certain definite pattern—the same thing, for instance, may be done over and over. Three steps forward and two back! Three steps forward and two back!

The excitement is purely automatic. The same movements are constantly repeated monotonously and aimlessly. For hours at a time the patient goes through peculiar and incomprehensible gestures, striking the floor alternately with the right foot and with the left foot, and extending her arms and clinching her fists in a threatening manner but never striking anyone. She stands up in her bed in a dramatic attitude, draped with the blanket, and frozen, so to speak, in that position, uncomfortable as it is. In her attacks of excitement she displays considerable physical strength (*20*, 240).

The excitement may involve speech. Here we may find incoherence, as we have previously illustrated. Or there may be *verbigeration*. In the latter case the individual may repeatedly produce some phrase in the same senseless manner that the girl, in the illustration cited above, repeatedly patted her foot. To illustrate such verbigeration we give the following account:

"What is that you say to yourself?" "Locks and keys, keys and locks, locks, keys, keys, locks, locks, locks, keys; just a sort of doggerel (perseveration). You know some of the attendants might get hold of me and punch me. Locks, keys, keys, locks, locks, keys, keys, locks. You know if they was to run across me making too much noise they might hurt me." "What do you say locks and keys for?" "Just to enjoy myself. You know there are times when there is nothing doing, and I have to do it to pass away the time, and you might just as well say something as nothing." "What did you say the other night to the students?" "Told them about locks and keys." "What else?" "Myriads of us keep growing in numbers, also in largenesses; locks and keys, keys, locks, locks, keys, keys, locks, locks, keys, keys, locks. Myriads of us quick-foot full through, ev-er no mat-ter. Locks, keys, keys, locks, locks, keys, keys. Myriads of us ev-er full us as keep lives giant's growths, ev-er lives giant's keeper, ev-er no mat-ter. Locks, keys, keys, locks, locks, keys, keys, locks. Lives giant's wealth, health and pleasures, ev-er no mat-ter. Lives sweet foreigners, ev-er no matter." "Can't you recite some more poetry?" "I cannot give any more; locks, keys, keys, locks, locks, keys, locks. . . . I will get in trouble. I have been raking away at it outside and in and inside out again. I have tried to write poetry, but could not write any more than six fools" (*24*, 183).

Paranoid Schizophrenia. This form may closely resemble true paranoia. The onset which is usually fairly slow is marked by insomnia, mild depression, heightened suspicion, fleeting hallucinations, ideas of reference, and delusions of persecution. In addition there is the characteristic emotional indifference and apathy of the schizophrenic. The

following case shows the suspicious nature and delusory symptoms of a paranoid schizophrenic:

A young man (25 years of age) was brought from the City Prison being charged with "unlawful possession of firearms." The history of this patient revealed that he had been born in Italy and was brought here by his parents when he was a boy five years of age. He had gone through school and had reached the last grade at 14 years of age. He was then taken from school in order to help support the family, and he was always rather suspicious, somewhat stubborn and difficult to manage. He had complained of the neighboring people because they "were interfering with him" and on one occasion he had struck one of his friends because the latter was forcing women to look at the patient in a peculiar way. He was discharged from the army because of some mental trouble. At the hospital the patient showed a very well-preserved physical condition. There was no evidence of any disease of the central nervous system.

A psychometric examination was performed, but the result was unsatisfactory as he showed a suspicious, rebellious attitude stating that the examiner was trying to influence his mind. He said that the reason for his possessing a revolver was that people were persecuting him and following him; that wherever he went they looked at him in a very peculiar way. The reason for their action was that he was very much liked by his officers in the army and since then they were all jealous of him. Lately the lady with whom he was boarding was in the habit of looking at him in a peculiar manner. He thought she probably had sexual designs on him but that it was an immoral thing to do; therefore she was trying to poison him. He believed she had influenced all the other men of the neighborhood so that nobody would now look at him. Furthermore, they were preventing him from securing any decent employment. They were making threats and were going to harm him; his food was now being tampered with and electricity was being put into his body. He therefore bought a revolver, in order to protect himself. He took a trip from New Jersey to New York and on the ferryboat people were making disparaging remarks about him, and had some secret code as evidenced by the whistling of the boats in the river, all of which was with the intention of doing away with him. He therefore took the revolver and flashed it before the other passengers, "to frighten them" and prevent them from possibly harming him (*21*, 182).

A number of explanations have been advanced to account for these four forms of schizophrenia. Some of these stress heredity. Myerson, for example, speaks of this disease as "running in families." White refers to some studies of Wolfsohn which seem to indicate a hereditary trait. Other studies, however, do not lay so much stress upon this factor. Pollock's investigation, which in the opinion of May is the most exhaustive study yet made (1922) of dementia praecox, "shows that fifty per cent of the cases have a family history of insanity, nervous

diseases, alcoholism or neuropathic or psychopathic traits, with a full fifty per cent showing no evidence of unfavorable heredity" (*14*, 459). Kraepelin holds the underlying conditions to consist essentially of an endocrine disorder of the sex glands—a disturbance which is, in turn, determined largely through heredity.

It is probably true that there are cases in which a hereditary tendency toward organic degeneration may play a part. However, the particular manner in which this takes place is not clear. It is quite evident that the distribution or occurrence of the disease does not follow the well-known Mendelian principles. In opposition to the above position which stresses the hereditary determination of schizophrenia stand the more sensible psychogenic explanations. In these, the emphasis is chiefly laid upon peculiarities of the personal history and the conflicts of the individual.

Generally speaking, schizophrenia is a disorder to which the introverted type of Jung, the schizoid type of Kretschmer,[1] or the "shut-in personality" of Hoch[2] is peculiarly susceptible. Such an individual, as we know, is dreamy, mystical, diffident, reserved, easily embarrassed, anti-social, unsympathetic, and cold. He cannot express himself. He cannot talk easily about personal matters.

Where environmental conditions tend to push such introversion to extremes, schizophrenia is a likely outcome. The clearest picture of this disease is painted, therefore, in terms of introversion. Only in this disease the features are more sharply drawn. In both introversion and

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[1] Of this type Kretschmer writes: "The schizoid does not get on in a crowd. . . . They growl or run away when any one comes; or they sit there and feel tortured. . . . The majority of schizoids are not either over-sensitive or cold, but are over-sensitive and cold at the same time. . . . Out of our schizoid material we can form a continuous series, beginning with what I call the 'Holderlin type,' those extremely sensitive, abnormally tender, constantly wounded, mimosa-like natures who are 'all nerves'—and winding up with those cold, numbed, almost lifeless ruins left by the ravages of a severe attack of *Dementia Praecox*, who glimmer dimly in the corner of the asylum, dull-witted as cows" (*13*).

[2] Hoch defines this type of personality in the following terms: "Persons who do not have a natural tendency to be open and to get into contact with the environment, who are reticent, seclusive, who cannot adapt themselves to situations, who are hard to influence, often sensitive and stubborn, but the latter more in a passive than an active way. They show little interest in what goes on, often do not participate in the pleasures, cares, and pursuits of those about them; although often sensitive they do not let others know what their conflicts are; they do not unburden their minds, are shy, and have a tendency to live in a world of fancies. This," he remarks, "is the shut-in personality." He then adds: "What is, after all, the deterioration in dementia praecox if not the expression of the constitutional tendencies in their extreme form, a shutting out of the outside world, a deterioration of interests in the environment, a living in a world apart?"

schizophrenia there is a strong tendency to withdraw from reality into a world of dreams and phantasies. In this connection McDougall, referring to Jung, remarks:

> A great number of persons never find their way back from their dreams. They are lost in the maze of a magic garden where the same old story is repeated again and again in a timeless present. For such patients the hands of the clock remain stationary; for them there is no time, no further development. It is nothing to them whether they dream for two days or thirty years. . . . Schizophrenia is a dream state, a prolonged half-waking dream or fantasy; the patient is neither wholly awake nor wholly sleeping. As in sleep, he has lost contact with the world about him to the extent that all sense-impressions are apt to be interpreted in terms of the imaginative preoccupations of the moment; and he is out of *rapport* with persons about him. But, as in waking fantasy, he may walk about, using his sense-organs to guide his actions, and may respond to the advances of the persons about him in a partial and imperfect manner. His state is one between day-dreaming and night-dreaming" (*15*, 379).

Phantasy of this sort is assumed to be a primitive form of experience quite common to the child, but not the adult. The latter is assumed to have developed more satisfactory methods of meeting life's situations. He is supposed, as a result of his growth, to have laid aside the day dream as a way out of difficult situations. As a result, the adult use of the phantasy as an escape mechanism is assumed to constitute a regression. The individual failing in his conflict to secure a normal outlet —one more characteristic of his age—finds refuge in the behavior patterns of his childhood. As Noyes points out, the individual may find a permanent refuge in his earlier, childish patterns. "When the infantile mechanisms have once been thoroughly reanimated and the patient has found happiness and contentment in his world of phantasy, satisfaction is no longer to be had in the world of reality with its struggles, failures and painful experiences" (*18*, 146). With this interpretation in mind we can understand better the curious behavior postures, the increased suggestibility, the high degree of negativism, the "silly" laughter, the personal uncleanliness and lack of control over bodily functions, the great interest in self, the sudden "childish" outbursts of anger and attack characteristic of the schizophrene. In all these we have a picture of infantile conduct. The individual is a child again.

Two further lines of evidence serve to emphasize the psychological nature of this disease. One is that recovery may occur in many cases, particularly if proper treatment is given during the early stages. The other is the lack of any sign of physiological disorder. Many studies

have been made with the hope of discovering some organic change or condition which could be set as the cause. But the results have been negative. Many careful physical examinations of the spinal fluid, blood, lymph, and bodily excretions have revealed no consistent changes. And post-mortem examinations of the brain and other organs have shown no organic basis for the disease. If the psychogenic explanations are true, they give us a clear picture of the wholly devastating effect which conflicts may have upon the behavior of the individual during his development and in his attempts to maintain himself as a member of the society group.

MANIC-DEPRESSIVE PSYCHOSIS

Normal persons will testify that they have their share of emotional and moody "ups and downs." Some persons go for long periods during which the mechanism of life moves smoothly and soundlessly. After a time, however, the course of existence is jarred. Things no longer run so smoothly; the world is out of tune. Some see more of the "ups" than they do of the "downs." They are happy more often than they are unhappy. Others, however, see the opposite side of life. They are unhappy more often and to a greater extent than they are happy. Thus we find, generally speaking, three large groups of individuals in terms of the nature of the emotional life which they predominately show: a group at each extreme and a middle group in which the individuals are neither happy most of the time nor unhappy most of the time.

Manic-depressive psychosis is a disease in which the individual is either very happy and excited, or very sad and depressed. These two extremes, superficially regarded, would seem not to belong together. But it has been shown that frequently the individual diseased in this manner may exhibit one phase at one time and then may turn later to show the reverse side of the picture. He may be excited today, but tomorrow he may be depressed. These two phases may alternate quite regularly or very irregularly. The irregularity may be so great that we may find the individual excited most of the time. On the other hand, we may find that another individual is depressed most of the time. In these two extreme cases, we may discover the individual exhibiting a normal stage which may be followed in turn by an attack, either similar to the last or just the opposite of the last.

This psychosis is essentially a disease of the emotions. Individuals show either exaltation or depression. In all cases, there are unstable behavior symptoms; that is, the actional patterns are expressive of the emotional state of the individual. In mania, for example, there is boister-

ousness, hurrying, shouting, dancing, singing. In depression there is the drawn face, the slow gait, the low voice of the sorrowful. In mania, there is a rapid flight of the imagination. In depression, there is impeded reproduction. In the more extreme cases, disturbance of reasoning in the form of delusion of grandeur appears. In general, the delusions are unsystematized and transitory. Mania reminds one of an individual who is happily drunk or full of some delirium producing drug. Depression reminds one of an individual who has lost everything which he holds dear and worth-while.

Manic Phase. Mania shows three degrees. Classified in terms of degree of deviation from normal, they are: *hypomania, acute mania,* and *hyperacute mania.* In *hypomania,* the individual is joyous. He is exalted. His face beams, and his eyes glisten. He radiates cheerfulness and happiness. He talks loudly and vehemently. His clothing may be in keeping with his emotional set—gay and a bit fantastic.[1] He is inclined not to be pugnacious, yet if unduly thwarted in his actions, he may burst into a fit of anger and abuse. Under such conditions he may be quite dangerous. In a short time, however, he returns to his earlier state. He will write hurriedly, voluminously, but more or less incoherently about many topics. If he is kept at some task, he may do fairly well at it. At least, he will expend a great deal of energy in that direction.

In *acute mania,* there is a speeding up of all activities. The individual works faster, moves faster, and talks faster. In the rush to do things he may damage himself and objects. When he attempts to relate some story, he may become wholly incoherent. Hallucinations and delusions may occur. The hallucinations, however, are usually unclear. The delusions are not well systematized. In *hyperacute mania,* the individual throws himself and objects about in a wholly delirious or frenzied manner. If not protected, he may do serious injury to himself and others. He shouts incoherently until he cannot speak; he jumps, hops, runs here and there, struggles with others or with environmental objects until physical exhaustion brings him rest. The manic phase may last but a few hours; again, it may continue for years.

Depressive Phase. Here the reverse side of the picture appears. The individual who last week or last month was so gay and so active is now sad and quiet. The depressive phase shows three degrees corresponding to the three stages of mania. These stages are: *simple retardation, acute melancholia,* and *stuporous melancholia.* In the first, the individual is

[1] "One patient was released from the hospital for a day to attend the funeral of his mother. He returned with a broad band of crepe on his coat sleeve, wearing a red tie, purple stockings and a waistcoat of gay colors" (*18,* 102).

best described as one with a bad case of the "blues." He is despondent. Everything is so "useless." He speaks slowly and with a saddened voice. He may occasionally weep over his fate. In *acute melancholia*, each of these symptoms is more marked. He is very sad; he often sits bent over with his gaze upon the floor. He may cry until he becomes partially blind for a time. If he speaks, it is very slowly as if with the greatest effort. He may not be able to speak. His lips may move, but no sound is made. When this stage is still further exaggerated, we get *stupor*. In this state, there may be a clouding of consciousness and disorientation. The individual and the environment are severed. The individual may be practically helpless. Dreadful hallucinations and delusions may occur here, according to White, to add to the individual's fears.

We wish to cite the following case which shows both sides of this disorder—the manic as well as the depressive phase:

I have suffered all my life from excitements and depressions, although it was not until I was fifty-eight years of age that my family and I realized that I was really insane and required institutional care. During youth and middle age my excitements were of a mild character, and during these periods I considered myself normal. I felt peculiarly happy and carefree. I managed my household affairs with the greatest ease. I entertained and mingled in society with pleasure and zest. I was lively, talkative and I have reason to believe I was witty and entertaining. I could work without an effort. I at times accomplished almost Herculean tasks. On one occasion I remember preparing and conducting a church entertainment by which the sum of $800.00 was raised. Of late years my excitements have grown more severe. I begin by taking an overactive interest in everything going on around me. Everything seems rosy. I feel happy and nothing depresses me. I feel propelled by some unknown force to constant action. I am possessed with the idea of righting wrongs and straightening out things in general. All the faults in the administration of the ward, the Hospital and the Government must be corrected. . . . My excitements have never led me to commit any acts of violence. I occupy myself largely in talking and writing letters. My room is often in disorder because I cannot stay at one job long enough to complete it. As I feel these excitements approaching, I request the physician in charge of me to take up my parole, as I know I shall be moved to do and say many foolish things of which I will be ashamed later. No one who has not had experience can realize the mortification of having been insane.

My depressions in early life were as mild as my excitements, the onset was gradual. I felt a disinclination to mingle in society. When forced to do so I sat like a "dummy" and could think of nothing to say. My household duties became a burden. One after another of these was dropped until the care of the household was entirely given over to relatives or servants. I learned

from experience a treatment of my own. As soon as I felt a depression approaching, I promptly dropped everything and left home for a time. I found by getting away from family cares and responsibilities, and from the demands of society, to some quiet spot, I could shorten the duration of these depressions. In recent years the depressions have appeared suddenly. One day I went to town to do some shopping for a friend. I went to a grocery store to make some purchases. It suddenly occurred to me that I could make these to much better advantage at the market only a block away. Suddenly I realized that I did not have sufficient energy to go to the market, and that another depression was upon me. It was with the greatest difficulty that I ordered the goods, paid for them and came home. At these times my brain feels paralyzed. I have not the strength or ambition to do anything. I am apprehensive lest some harm has befallen the members of my family, but to save my life, I could not write or telephone to find out if my fears are true. I have the impulse to act, but it seems as if something shuts down and prohibits action. I see my clothes becoming soiled—I know I should change them, but I cannot pull out the drawer of my bureau and get clean ones. This inertia is greater in the morning than at night. Before I came to the Government Hospital I had servants who slept at home, and came to my house early in the morning. When my husband was away and my children were small, it devolved upon me to admit these servants early in the morning. I knew that when morning came to dress and go down stairs would be impossible. I solved the difficulty by dressing the night before and sleeping in my clothes. When the depression is most profound, I move in a fixed groove. I never vary a hair's breadth. At first I have a desire to remain in bed. Once this is overcome I have no choice but to remain up. I sit in the same seat and in the same attitude for weeks. As I come down stairs in the morning I am apprehensive lest my seat be taken, and I wonder what I shall do if it should be occupied, although the sitting room is well supplied with comfortable seats. I bring a shawl with me, and place it in the chair so that no one will appropriate it while I am at breakfast (*24*, 134).

Although we recognize that other factors such as heredity of glandular troubles may play a part, we shall, nevertheless, accept a psychogenic explanation of this psychosis.[1] We shall assume that the symptoms

[1] "In the Manic-Depressive Psychoses there are as yet no definitely proven pathological changes found in post-mortem examination, nor are there as yet any definitely established pathological findings from other sources which bear an undisputed relationship to this disorder. We must bear in mind, however, that there is an extensive group of scientifically inclined medical workers, who are utilizing every modern method of diagnostic procedure in their endeavor to solve the causes underlying these disorders. However, while we are anticipating results that may prove a boon to humanity, yet in the present state of our knowledge no data are available that could explain the mechanisms involved in these cases other than psychogenic ones. We therefore must regard this group also as a type of reaction to a situation on the part of individuals possessing a distinct mental make-up" (*21*, 186).

shown in this disorder are the results of conflict and attempts at solution. The particular solution (in mania) takes the form of a "flight into reality." It is an attempt to get away from some distressing condition by becoming intensely active. The greatly heightened activity of the maniac is assumed to represent a defense against thinking about the thing that troubles. Mania represents the typical extrovert's most serious attempt (aside from suicide) to settle his struggle. He is apparently denied such devices as regression, phantasy, sublimation, and the like. Urged on by the unconscious, he takes the initiative and seeks to guard every approach to his complex. His inability to meet with success leads to his depression. He is overwhelmed with a sense of complete failure. He realizes his utter helplessness in the face of too great odds. He gives up in despair. In all cases the real determination in both these aspects is unconscious. Noyes remarks:

> The manic-depressive psychoses represent the reactions of the entire personality to difficult and painful problems and situations which have an ultimate origin in the unconscious. While the conspicuous symptoms presenting themselves to the observation in these psychoses are the disturbances of emotion or affect, of the stream of thought and of motility, yet it is the entire organism, not merely the higher mental processes, but sensori-motor and vegetative processes as well, which participates in the reaction (*18*, 97).

ORGANIC PSYCHOSES

Here we face mental diseases which are definitely related to physiological and anatomical conditions. The presence of "old age," brain tumor, or syphilic infection may directly contribute to mental disease. In these three conditions gross changes in the structure and functions of the central nervous system serve as the "bodily basis" of mental disease. In addition, mental disorder occurs under too great use of alcohol and drugs, under injury to the brain, in various physical diseases and disorders. We wish here to consider briefly the mental disorders found in connection with three conditions; *viz.*, old age, brain tumor, and syphilis.

Senile Dementia. This is a disease of old age.[1] It is the mental price which some pay for living too long. The mind dies, so to speak, while the body lives on. This disease may appear in the forties, but as a rule it does not come until the individual reaches the sixties.

In the more pronounced cases, it involves the whole range of psychological functions. The impairment of the behavior patterns is, of

[1] In addition to age, there are such predisposing conditions as heredity, alcoholism, overwork, violent emotions, and organic injuries.

course, well known. The individual is no longer able to *act* as he did in his former years. Perception, too, is greatly affected. The individual becomes blind, deaf, and insensitive. Hallucinations occur. The individual, when he does perceive, may confuse the product of his hallucinations with those of his perceptions. Moreover, he is disoriented. The objects of his home are not perceived as such; he begs to be taken home. He no longer recognizes his friends and the members of his family.

His memory shows very great disturbances. He may be incapable of remembering the experiences of the previous moment. He shows both anterograde and retrograde amnesia. He falls back upon his more remote past, which remains with him for a time. Cut off from the present, he lives, of necessity, in the past. His emotional nature undergoes considerable distortion. One of the earlier signs of approaching senility is emotional. The individual becomes morose, querulous, irritable. He may become quite irascible and difficult to handle. He may exhibit spells of complete despondency. Thinking, too, is interfered with—the individual is incapable of sustained thought. Mild unsystematized delusions of persecution and grandeur appear and temporary distort his behavior toward others. He is incapable of grasping new ideas. He gives his old impressions time and again in the same fixed way. Thus we account for the verbigerative tendencies of old age.

The major symptoms of some of the various forms of this disease as stated by the American Psychiatric Association are as follows: (a) Simple deterioration: Retention and memory defects, reduction in intellectual capacity and narrowing of interests; usually also suspiciousness, irritability and restlessness, the latter particularly at night. (b) Presbyophrenic type: Severe memory and retention defects with complete disorientation; but at the same time preservation of mental alertness and attentiveness with ability to grasp immediate impressions and conversation quite well. Forgetfulness leads to absurd contradictions and repetitions; suggestibility and free fabrication are prominent symptoms. (c) Delirious and confused types: Often in the early stages of the psychoses and for a long period the picture is one of deep confusion or of a delirious condition. (d) Depressed and agitated types: In addition to the underlying deterioration there may be a pronounced depression and persistent agitation. (e) Paranoid types: Well marked delusional trends, chiefly persecutory or expansive ideas, often accompany the deterioration and in the early stages may make the diagnosis difficult if the defect symptoms are mild.

Senile dementia is progressive until death. The various abilities

gradually decline. The individual slowly grows weaker, more confused and disoriented until he becomes physically helpless and mentally stuporous. The individual has run his life course, but cannot die. The brain shrinks; its weight decreases; the cortex softens. There is no cure. The picture fades out.

Brain Tumor. We discuss this phase of mental disease because it illustrates a way in which a mental disease may be produced without such deteriorative changes as occur in senile dementia or without such destructive changes as are found in general paralysis with syphilis. Here the bodily disturbance is structural and mechanical. The addition of further tissue under the unyielding dome of the skull brings increased pressure to all parts of the brain and particularly to those areas surrounding the tumor. The whole organism is seriously affected.

Among the various psychological disturbances, we find slowness or difficulty of comprehension, indifference, personality and character change, disturbance of memory, slowness of thinking, impairment of attention, irritability, obstinacy, rambling of the train of thought and at times a silly jocularity and facetiousness. Some patients show a tendency to be suspicious and may even exhibit delusions of a persecutory nature. Others become much demented and develop untidy habits. In general the patient does not realize the change in his mental state (*18*, 222). Lacking surgical relief, the individual rapidly declines psychologically and physically until death itself affords relief.

Paresis (General Paralysis, Dementia Paralytica). In paresis we face a mental disease that is to be directly attributed to a pathogenic organism. Paretic disorders do not occur in the absence of *syphilitic* infection of the brain. The protozoan organisms responsible for this disease attack the cortex of the brain with resultant destruction and degeneration of the superficial tissues. In turn, profound psychological changes appear in all the functions.

The onset of the disease, which may occur anywhere from ten to twenty-five years following infection, is very insidious. But once it has started, the decline is fairly rapid. In some cases death ensues in a few weeks. The average duration, according to Rosanoff, is 2 or 3 years. In the beginning, the individual suffers with insomnia, headache, loss of appetite, malaise, slight bodily tremor, irritability. Fatigue gradually comes more quickly. The person cannot stay at his task; he neglects his work. Memory becomes impaired, and thinking is interfered with. The person is unable to weigh matters critically. He shows bad judgments in his business relations, and sustains heavy financial losses.

More serious changes follow, involving all the personality traits.

The individual becomes careless of his dress and indifferent to the rights of others. He flies into fits of rage over trifling affairs and abuses his business associates and members of his family. Inhibitions break down; he is inclined to alcoholic excesses and to gross sexual laxity. The disease progresses. Delusions and hallucinations occur. In a short time, memory and association are practically gone. Speech thickens and becomes impossible. During this time convulsive attacks of epileptiform nature wrack the organism. Before death the picture is one of *profound dementia* and *complete helplessness*. The psychological organism that was once a man now stands reduced to a vegetative level of existence.

BIBLIOGRAPHY

1. Abbott, E., "The Mechanism of Paranoia," *Jour. of Nerv. and Ment. Dis.*, *45*, 204.
2. Bleuler, E., *Textbook of Psychiatry.*
3. ————, *The Theory of Schizophrenic Negativism.*
4. Conklin, E., *Principles of Abnormal Psychology.* 1927.
5. Fisher, V., *An Introduction to Abnormal Psychology.* 1929.
6. Hart, B., "The Conception of Dissociation," *Brit. Jour. of Med. Psychol.*, 1926, *6.*
7. Hoch, A., "On Some of the Mental Mechanisms in Dementia Praecox," *Jour. of Abn. Psychol.*, 1910, *5*, 255.
8. ————, "Constitutional Factors in the Dementia Praecox Group," *Rev. of Neurol. and Psychiatry.* 1910.
9. Jung, C., *The Psychology of Dementia Praecox.* 1909.
10. Kraepelin, E., *Dementia Praecox.*
11. ————, *General Paresis.*
12. Krafft-Ebing, R., *A Textbook of Insanity.* 1905 (Trans. by Chaddock).
13. Kretschmer, E., *Physique and Character.* 1925.
14. May, J., *Mental Diseases, A Public Health Problem.* 1922.
15. McDougall, W., *Outline of Abnormal Psychology.* 1926.
16. Meyer, A., "The Nature and Conception of Dementia Praecox," *Jour. of Abn. Psychol.*, 1910, *5*, 274.
17. Myerson, A., *The Psychology of Mental Disorders.* 1927.
18. Noyes, A., *A Textbook of Psychiatry.* 1927.
19. Pollock, H., "Dementia Praecox as a Social Problem," *State Hospital Quarterly.* 1918.
20. Rosanoff, A., *Manual of Psychiatry.* 1920.
21. Sands, I., and Blanchard, P., *Abnormal Behavior.* 1923.
22. Solomon, H., "General Paresis," *Amer. Jour. of Psychiatry*, *2*, 1923.
23. Taylor, W., *Readings in Abnormal Psychology and Mental Hygiene.* 1926.
24. White, W., *Outlines of Psychiatry.* 1921.
25. Wolfsohn, J., "Predisposing Factors of War Psychoneuroses," *Jour. of Amer. Med. Asso.*, 1918, *70*, 303.

CHAPTER XVIII

TREATMENT OF PSYCHOLOGICAL DISEASES

We have hurriedly covered the field of psychological diseases. Their nature, symptoms, causes, and extent have been considered. One phase of this general problem of the abnormal now remains. It has to do with the manner of dealing with or treating these diseases. This is the problem of therapeutics.

We do not seek here to discuss in detail the therapeutic measures to be employed with each mental disease. We do wish, however, to consider the more outstanding ways of dealing with mental disorders as a large class of psychological phenomena. Therapeutic methods, so far as we are concerned here, may be grouped into two classes. The one class, which is not strictly psychological, involves the use of drugs, rest, and diet. We shall not discuss this group. The other class involves the use of such devices and mechanisms as: hypnosis, suggestion, autosuggestion, psychoanalysis, transference, and catharsis. We turn now to consider these under the large head of psychotherapy.

PSYCHOTHERAPY

Psychotherapy is an attempt to treat in a psychological manner those individuals who show the strictly psychological diseases. The psychotherapist assumes that the *purely functional* disorders are of a sort which cannot be adequately treated by such physicotherapeutic methods as drugs, diet, massage, electric stimulation, and rest. While he clearly recognizes the value of such methods in the treatment of some of the mental diseases, he maintains that their value rests primarily upon the nature of the psychological appeal which they make to the individual. They tend, for instance, to create desirable mental attitudes, or they prepare the way for a more effective use of psychological methods.

Psychotherapeutic methods are valuable even in the treatment of the many of the "purely" physical diseases. In such troubles the physician recognizes, for instance, the major importance of the patient's desire for recovery. He knows that the confidence which the patient has in his abilities and in the methods which he employs plays a part in the whole affair. Furthermore, the intelligent physician does not

minimize the recuperative value of continued cheerfulness, of high hope, or of a strong determination on the part of the patient to throw off the effects of a disease. Such psychological factors never kill pathogenic organisms, it is true, but they no doubt serve in many cases to strengthen organic resistance and hasten the recovery of the individual.

Psychological ways of treating mental diseases are very old and well-nigh universal. For *every* sort of disease, some savages as well as some of our countrymen employ means which are, in reality, psychotherapeutic in character. Where diseases are ascribed, for example, to the work of evil spirits, or are held to be the result either of a sinful nature or of ignorance of supernatural laws, methods of treatment which are really psychological in character are found. At times, these methods produce, as we know, results of a very valuable sort. Among the more intelligent groups where the personality and the reputation of the physician enter to bring relief in the patient, we again see psychological factors at work.

In theory, the task of psychotherapy may be regarded as being twofold. There is (1) exploration, which is accompanied or followed by (2) expression and redirection of energy, and relief. Sometimes this distinction is quite clear. At other times, relief (cure) follows so closely upon exploration that the two seem to be as one. The exploration in such cases appears actually to be curative. In exploration, an attempt is made to lay bare the *causes* of a disease. A search is made for the origin of a disorder. In redirection, the individual may face the true character of original situation which resulted in his disturbance, and assume a more wholesome attitude, secure a new point of view, or establish a new reaction pattern. He gets a sensible grasp of the nature of the trouble; he becomes, we say, reëducated. In other cases, however, relief appears to come chiefly in working off the emotional element of an earlier but now repressed experience.

As exploratory devices, we shall consider the various methods of psychoanalysis. Among the several methods of giving relief we shall consider *suggestion, catharsis or abreaction,*[1] *transference* and *sublimation* We shall in no way attempt to draw a sharp distinction between the processes of exploration and redirection.

Psychoanalysis.[2] This is essentially a therapeutic procedure of

[1] A name coined by Brewer and Freud. The mechanism involved here is quite like that found in the confessional. It works much like a good cry, or a burst of hearty swearing. In all such cases the individual, so to speak, gets "a load off his chest."

[2] The use of psychoanalysis as a therapeutic device rests on the major assumption

treating *functional* diseases. It is a method of reviving memories of some unpleasant or painful experience, the repression of which into the unconscious has been disastrous to the individual. Coriat writes:

> The human mind is ever on the alert to protect itself through repression into the unconscious from painful memories and anxieties, but sometimes this repression oversteps itself and leads to all sorts of neurotic disturbances. . . . Psychoanalysis is the method of probing into these unconscious psychological settings. All psychoanalysis leads to the realm of the unconscious, that strange mental world, barbaric, primitive, the repository of repressed emotions, of a sort of elemental Titan, which at times pushes the censorship aside and allows these infantile emotions to invade consciousness. There they are perceived like a foreign body and manifest themselves in anxieties, fears, depression, and compulsive thinking. . . . It is the task of the psychoanalyst to investigate the origin of these hidden repressions through the technical methods which have been devised in the development of the science (*8*, 4).

Psychoanalysis, then, is a means of exploring the subconscious or of ferreting out those complexes which operate to disturb the personality of an individual and of dealing properly with them. The psychoanalyst assumes that a complex, resulting from some previous conflict, is the true root of the functional disorders. These stored-up complexes may influence the course of one's whole life. They appear in dreams, but in a fantastic and distorted manner and they produce hysterical spells. The complex causes recurrent attacks of fear or obsession, and produces inhibitions of thought as in the association tests. "The stored-up emotional complex is distinctly the most important factor in abnormal psychology" (*6*, 36).

A psychopathological state,—for example, hysteria—is due, according to this way of thinking, to a suppressed wish or desire, or to a dissociated condition of the personality. In order to secure relief, the complex must be discovered and removed.

> The cure of such disturbances depends upon the discovery of these repressed complexes or disturbing traces of former experience. If the sufferer is unable to recall any experience which might be the cause, then the psychologist or psychopathologist or psychoanalyst must seek such means as will be of aid in

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that some psychological diseases are psychological in origin. Certain psychological events in the history of the individual are held to be responsible for the disorder. Treatment, then, must consist essentially in determining the nature of these antecedent events, or causes, and in dealing with them in such a manner that they become inoperative. As we have previously remarked, it seems almost universally agreed that all the psychoneuroses, as well as some or all of the major functional psychoses, belong to the diseases of a psychogenic order.

detecting the nature of the repressed material. If he can discover the probable nature of the repressed material he can then devise a mode of approach for arousing a memory of the actual experience or experiences which constitute the cause of the disturbance (*5*, 191).

The complex in most cases can be discovered only through the employment of skillful devices and careful technique. In order to be successful, psychoanalytical methods demand both technical knowledge of abnormal psychology and a high degree of skill on the part of the operator. They require time, patience and experience, and no small amount of insight; for the correct interpretation of the data is in many cases a more difficult task than their collection. "No fragment of memory, emotion, dream, or symptom can be ignored," writes Coriat; "we must follow the mental life of the subject through all the ramifications of the psychopathological maze" (*6*, 214). Where the experiences have left fairly permanent modifications, it is usually possible to get at them through the use of various technical devices.

The analytical tools by means of which this probing into the subconscious may be most effectively done are essentially psychological in character. They are, then, quite different from the cold steel of the surgical clinic. They take the form of suggestion, hypnosis, free association, controlled association, ordinary mistakes, and dream analysis. Properly employed, these devices expose the source of the trouble; they reveal the root of the disorder. By their correct use, the troublesome repressions may be robbed of their powerful drive; the symptoms of disorders may be removed; the dissociated (disintegrated) states may be reintegrated or resynthesized. The individual may be returned to a normal condition.

Suggestion and Hypnosis.[1] These two are intimately related. We shall speak first of suggestion of which hypnosis appears to be but one form. Suggestion, as we have said, is a tendency on the part of an individual to act uncritically and unquestioningly upon being told to do something, upon seeing an act in another or upon reading or hearing some statement. Suggestion is marked by a lack of inhibition. There is nothing to restrain the behavior of the individual. He acts without thinking.[2] A number of conditions tend, we know, to heighten the degree of suggestibility. Darkness, drugs, fatigue, awe, respect, prestige may be listed. In addition, we know that children, savages, unedu-

[1] Some do not regard suggestion and hypnosis as a form of psychoanalytical procedure. We shall shortly speak of this matter.

[2] McDougall holds that suggestibility is to be explained in terms of the operation of the instinct of submission, obedience, docility (*24*, 103f).

cated persons, mentally deficient individuals, and emotionally excited persons are strongly inclined to be suggestible. They are ignorant. They lack or are unable to use a sufficient degree of knowledge and understanding to make them critical. Finally, we recognize that the hypnotic state is one of great suggestibility. It is, according to Janet, a form of artificially increased suggestibility.

We recognize the therapeutic value of suggestion in a great many of the affairs of the daily lives of people. The child which suffers a hard bump comes screaming to its mother. She kisses the child, and tells it that it is all right, and the child ceases to cry. She does not, of course, remove the laceration or the inflamed spot. But she does aid in removing pain. We see suggestion at work in the case of the patient who immediately "feels" relieved when the physician arrives, in the injured person who secures a better hold on himself when a friend touches his shoulder or his hand, and urges him to bear up. We see it at work in dispelling intense fears and stage fright, in avoiding insomnia, or in eliminating worry. We find, perhaps, the most striking examples of what may be done through suggestion in the remarkable cures produced by Coué and others like him, by magnetic healers, by religious places, objects, and persons. In every case where suggestion operates to produce a "cure," we must assume that the disorder was functional. The disease may be so serious, it is true, that the individual is quite unable to maintain himself economically and socially, yet it is functional.

In the school of therapy known as Couéism, the individual seeking relief is supposed to repeat to himself with a feeling of strong conviction some phrase such as the following: "Day by day, in all respects, I am getting better and better." This is seen as a way of building up courage, of securing faith in one's abilities, of establishing more efficient behavior patterns, of overcoming purely functional handicaps. The fact that Coué was able to give some aid to many and to cure others in this manner clearly attests to the value of the method. Coué held that his methods could be applied wherever autosuggestion was effective. Such means, he pointed out, might aid, but not cure, diseases of an *organic* nature. But they could not be used with children nor with any person incapable of proper understanding and full coöperation. Furthermore, they could not work with persons who were antagonistic, or who were prejudiced.

From time to time, "magnetic healers" have performed remarkable cures. They have removed serious symptoms characteristic of the functional disorders. They have done this either by personal contact with the diseased individual or through the use of implements laid or rubbed upon the affected members. Such instruments, the person seek-

ing relief is informed, possess curative properties.[1] Many of these devices are but modern forms of the older methods used by Mesmer and others of his day. The instruments in such cases serve largely to reenforce the suggestion. They are simply means of impressing the individual. In a great many of these cases, hypnosis is unquestionably induced, although it is not the intent of the agent to do so.

In religious healing we discover a very old and widespread use of suggestion. It is common knowledge that through religion a great deal of suffering may be relieved, many serious disease symptoms may be removed, and normal attitudes of mind may be restored. One has to recall in this connection many accounts of the healing powers of great religious leaders. Jesus, for instance, is accredited with having produced remarkable cures. Some contemporary forms of religion are essentially grounded in therapeutics. Dowieism and Christian Science are two outstanding religious sects which stress *healing*. The work of of these two creeds alone furnishes clear and unmistakable evidence of the therapeutic potency of religion. Dowie taught that cures might be obtained either through direct or intercessory prayer, or through the laying on of hands by certain chosen ones.

In Christian Science, a disease is held to be "unreal," or to be an "error of mortal mind." It is, in short, a result of ignorance. Through increased knowledge and heightened understanding the individual is enabled to combat diseases. The psychologist sees in such cases striking examples of how far suggestion may carry the individual toward relief or prevention of mental disease. It is a case of suggestion, he claims, reënforced by profound faith. It is an effective combination of therapeutic agencies. Christian Science has another value. In this connection Ewer remarks that:

> The principal merit of Christian Science, psychotherapeutically speaking, is its mental hygiene. It prescribes the cultivation of a cheerful attitude toward life's sorrows, and a general banishment of the discontent, fear, worry, carping, and resentment which constitute a far greater burden to most persons than actual illness. A sunny disposition has a prophylactic value, but apart from this it is a blessing which most of us need, and which other forms of Christian faith would do well to include in their daily practice (*12*, 341).

Like suggestion, hypnosis is an outstanding psychotherapeutic method. But unlike suggestion which may be employed under ordinary conditions without any serious consequences, hypnosis is a method that should be used only by highly trained individuals. As Münsterberg

[1] See Fishbein, M., *The Medical Follies*. 1925.

puts it, "The use of any one of these psychotherapeutic methods, notably of any hypnotic method, must absolutely be confined to the well-trained, scientific physician. He alone should employ hypnotism, just as he alone uses the morphine syringe. To produce hypnotic states for experiment's sake is most inadvisable, as it is surrounded with dangers even if we abstract from the moral issues. To play with hypnotism as a parlor trick is a crime" (*27*, 448). Speaking in the same vein, Coriat condemns the use of psychoanalysis by ignorant individuals. "For an untrained person to use psychoanalysis," he writes, "is as much to be deprecated as it is for some one to use radium who is ignorant of the physics of radio-activity or as dangerous as to attempt a surgical operation without a knowledge of anatomy" (*7*, *22*). Hypnosis has had a long history. We wish to say a word concerning its nature and the uses to which it has been put in the field of the abnormal.

The first deliberate attempt to employ the mechanism of hypnosis in a therapeutic manner was made by Mesmer more than a hundred years ago. He was able to produce many striking changes in behavior of his patients either directly by touching them or indirectly by causing them to touch objects with which he had been in contact. Mesmer assumed that a magnetic fluid existed in his body to the action of which he attributed the phenomena which he observed. This magnetism, he believed, could be passed to the patient either directly through personal contact or indirectly through some intermediary agent (object) which had been in contact with his body. Mesmerism, as the method was then know, flourished greatly for a time, but gradually declined. It is interesting to note that although his fundamental assumptions were shown to be false, yet through suggestion his procedure was effective. As Hart remarks, "Whatever we may think of Mesmer's methods there can be no doubt that results were produced" (*16*, 13).

Braid, an English surgeon who became interested in Mesmerism, was able to induce the characteristic phenomena in his friends and others by having them steadily fixate some simple object; *e.g.*, the neck of a bottle. He discarded the term Mesmerism and spoke instead of hypnosis. He assumed that the hypnotic state was induced through a derangement of the nervous, circulatory, respiratory, and muscular systems under very close attention together with bodily relaxation. The whole hypnotic procedure, according to Braid, rested primarily with the subject. The symptoms were the result of suggestion. Braid sought to establish hypnosis as a psycho-medical agent, but was unsuccessful, and for a time the interest in hypnotism declined. Then Bernheim of the Nancy School revived and accepted most of Braid's claims concerning

the part played by suggestion. To him, hypnosis represented a form of sleep—a temporary abeyance of psychological functions—induced through suggestion. Before Bernheim, Charcot missing the point of suggestion saw in hypnosis a pathological condition of the organism approaching hysteria. The hypnotizable person was accordingly considered as being hysterical. In fact, hypnosis was for Charcot a symptom of a neurosis. This position has since been ably defended, among others, by Janet and by Brown.[1]

Coriat holds hypnosis to be a form of dissociation quite similar in some respects to the state of absent-mindedness. Concerning this point he remarks:

> Unlike absent-mindedness hypnosis is a special condition, in that the former is a spontaneous phenomenon, while the latter must be artificially produced through suggestion. Most hypnotic states are merely conditions of more or less intense abstraction, in which the subject can either open his eyes with ease or with some difficulty, and in which memory is clearly retained. The deeper hypnotic states, with catalepsy, automatism, and amnesia, usually occur only in hysterics or in highly suggestible individuals. Absent-mindedness is a temporary dissociation and terminates suddenly whether we will or no, while hypnosis can be indefinitely protracted by the operator, until a suggestion is given to awaken. Hypnosis, therefore, seems to be a special mental state, an artificial dissociation of consciousness strongly resembling, and in some cases absolutely identical with, normal absent-mindedness, but more intense and protracted, induced by suggestion and readily terminated by suggestion (*6*, 207).

The psychoanalytic school views hypnosis as a regressive phenomenon—as the expression of certain persistent childish tendencies. The hypnotized individual takes, it is claimed, a "childlike" attitude toward the experimenter who stands in a parent-like rôle. That is to say, the earlier fixation upon the parent is reënergized, and the subject becomes childishly submissive.

We are interested here in hypnosis as a possible means of treating the organism. We find that, through it, outstanding changes may be induced in the individual. Every function may be more or less modified. The normal person, while hypnotized, may be paralyzed, blind, and deaf. He may be unable to feel pain, experience embarrassment, or

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[1] Of his position, Brown writes as follows: "Among the hundreds of hysterics whom I treated during the war, I found that the degree to which they were hypnotizable corresponded with the degree of their hysteria or dissociatedness. As they became cured they became less hypnotizable, although they retained a certain amount of suggestibility. . . . I agree entirely with Pierre Janet that only hysterical patients can be hypnotized" (*4*, 101, 126).

know fear. He may experience clear hallucinations and hold to systematized delusions. He may be unable to recall anything which occurs during the hypnoidal state. A hypnotized individual is quite submissive and attentive to the experimenter. Although he may be wholly oblivious to the presence of others, he is keenly alive to the operator. He is, we say, in *rapport* with the experimenter. *Suggestibility*, *amnesia*,[1] and *rapport* stand, then, as fundamental characteristics of hypnosis. In these ways, the hypnotized person is like and also different from the person who is asleep, or who is hysterical, or who is absent-minded.

As a psycho-medical device, hypnosis has three major uses: anaesthetic, diagnostic, and therapeutic. It was used years ago by the French as an anaesthetic in surgical operations. Within recent years, it has been used in this country as an anaesthetic in minor operations. No doubt, hypnosis would find wider use if anaesthetic drugs were less easily administered, and if more persons were susceptible to "deep" hypnosis.

The diagnostic value of hypnosis is more important than the anaesthetic. Under hypnosis, an individual may be able to recall many events which are completely hidden from him during his normal state. In this way, causes of some mental trouble may be reported. As an illustration of the use of hypnosis in uncovering memories of some very early events, we refer to a case of an English officer of the World War, who came under Brown's[2] care. This officer was sent into the neurological wards because he was quite unable to stand shell fire. The moment that shells began to fall in his neighborhood, he would experience an irresistible impulse to rush into his dug-out and crouch there until firing ceased. He had been wounded some time before during an advance and left for several hours in No Man's Land under continuous shell fire. He reported a history of unusual timorousness and extreme weakness of memory during his youth. It developed that he had been nearly drowned at the age of three years, so his mother had told him, although he remembered nothing of the accident. Brown reports that he "hypnotized this officer and then directed his attention back to the drowning incident at the age of three years. He at once began to live again through this incident, gasping with terror as he again, in memory, fell into the water. He described the whole event with such a wealth of detail that it was

[1] It should be understood, however, that if the individual is instructed to recall later during the post-hypnotic state the events of the hypnoidal state, he can do so.

[2] Medical officer in charge of Craiglockhart War Hospital for neurasthenic officers during the World War.

difficult not to believe that he had been taken straight back to this early period in his life and was living again through the terrifying experience" (p. 129). Other events, each of which had supposedly contributed to the foundations of unusual nervousness and great timidity were in a similar manner laid bare. This process of uncovering was in itself a necessary step in securing subsequent relief.

Our major interest in hypnosis lies in its therapeutic value. It offers a device especially serviceable for removing the symptoms of some of the functional disorders. Under hypnosis, the individual may be brought to relive those earlier, but repressed, experiences which now operate to disturb him. Hypnosis is an aid to the individual in releasing those complexes which furnish the energy manifested in the symptoms. As an illustration of the possible use of hypnosis in this direction we cite the following procedure with a psychoneurotic patient:

Here is a patient who was blown up and buried by a shell explosion two days ago and lost consciousness. On regaining consciousness some hours later he found that he was quite dumb, and also had lost all recollection of the shell explosion and of the events immediately following thereon. In other words, he is functionally mute and has retrograde amnesia. His memory for other recent experiences is also vague, but he is in full command of gesture-language, and can write down on paper all that he wishes to say.

I interview him alone in my office and tell him in a tone of conviction that I shall restore his speech to him within in a few minutes if he will do exactly what I say. I then tell him to lie down on a couch, close his eyes and think of sleep. I urge him *to give himself up to sleep*, to let sleep come to him, as it assuredly will. I tell him that he is getting drowsy, his limbs are getting heavy with sleep, all his muscles are relaxed, he is breathing more and more slowly, more and more deeply. Above all, that his eyelids are getting heavy, as heavy as lead, that he feels disinclined to open them, that he cannot open them however hard he tries. At this stage, which generally supervenes within two or three minutes, he really cannot open his eyes. This is a stage of very light hypnosis quite sufficient for my purpose.

I now tell him that the moment I put my hand upon his forehead he will seem to be back again in the trenches, in the firing line, in the fighting, as the case may be, and will live again through the experiences that he had when the shock occurred. This I say in a tone of absolute conviction, as if there is not the slightest shadow of possibility of my words not coming true. I then place my hand on his forehead. He immediately begins to twist and turn on the couch and shouts out in a terror-stricken voice. He talks as he talked at the time when the shock occurred to him. He really does live again through the experiences of that awful time. Sometimes he speaks as if in dialogue, punctuated with intervals of silence corresponding to the remarks of his interlocutor, like a person speaking at the telephone. At other times he indulges in impre-

cations and soliloquy. In some cases he is able to reply to my questions and give an account of his experiences. In others he cannot do so, but continues to writhe and talk as if he were still in the throes of the actual experience. *In every case he speaks and acts as if he were again under the influence of the terrifying emotion.* It is as if this emotion had been originally repressed, and the power of speech with it, and is now being worked off and worked out (*4*, 123).

A very valuable therapeutic use of hypnosis occurs in connection with the psychological treatment of dissociated personalities. The above case might be considered as illustrative of dissociation. Hypnosis works effectively in the treatment of dual personalities. In the Beauchamp case, as we have previously seen, Prince was able to remove the disturbing mechanisms and to reintegrate the whole personality. Hypnosis is particularly serviceable in such cases in removing the amnesia which exists between the various personalities. As soon as the barriers are broken down so that the experiences of one state become common property of another state, a dual personality is no longer possible. In this connection McDougall remarks:

> It is not contested, even by those who deprecate the use of hypnosis, that hypnosis, whether in the deeper form or in the lighter form . . . is a condition peculiarly favourable to the recovery of amnesic memories. This, I think, is true of both dissociated and repressed memories, as also of those which are not easily recovered by reason of their remoteness in time and their trivial nature, such as many memories of childhood. The chief value of hypnosis and of hypnotic suggestion lies, to my mind, in their use as aids to exploration and the relief of amnesia, both repressive and dissociative. The use of hypnosis offers a short cut in the stage of exploration, which, in many cases, for lack of such aid, may be very prolonged (*24*, 464).

Hypnosis has other uses. It may be used to reduce pain, remove fears, destroy obsessions, combat manias, eliminate insomnia, or reenforce a determination to act in a given manner and so destroy old and, at the same time, build new behavior patterns. The individual may be instructed in a definite way during the hypnotic period. He may be told that he must act in a given manner at a later time when no longer in the hypnotic state. In this way a resolution to behave in a given way is strongly reënforced. The effects of the previous period of instruction under hypnosis endure in the form of a definite *set* or *inclination* toward certain types of conduct. In this connection we note a remark of Coriat's to the effect that "the negative suggestion against drink, combined with the positive suggestion of increased will power to resist the temptation, has often such a far-reaching effect that it might almost be said to

reconstruct the personality" (*6*, 209). The stage of actual hypnosis is valuable, then, not only in exploring the individual's past; it also helps him to free himself of disturbing psychological conditions. It serves, moreover, as a preparatory period in which the behavior of the individual during a later waking state may be partially determined.

METHODS OF FREUDIAN ANALYSIS

Most psychoanalysts do not use hypnosis. In fact, the strict followers of Freud have no use for it. When Freud started his therapeutic work, he employed hypnosis, but later he abandoned it because he found that as many as one-third of his patients could not be hypnotized. He also believed that the breaking down under hypnosis of the resistance which kept some memories from being recalled merely resulted in building up resistance in other memories so that new symptoms took the place of the old symptoms.[1] Ferenczi, for example, psychoanalyzed some patients with whom he had earlier used hypnosis. He concludes that under hypnosis unconscious sexual tendencies were transferred from the original object—the parent—to him (the hypnotist). In such cases, he claims no permanent cure was produced. Since other psychotherapeutic methods have been found to be more effective with all patients, Freud and his followers have turned to them. If we do not consider hypnosis as a form of psychoanalysis, we must then say that Freud developed the methods of psychoanalysis as a more satisfactory means than hypnosis of exploring the unconscious.

In throwing hypnosis overboard, the psychoanalysts also got rid of suggestion. They strenuously maintain that suggestion cannot significantly enter into psychoanalysis. Their cures are not to be attributed to any subtle use of direct or indirect suggestion. Suggestion, they say, tends to get rid of one set of symptoms. But later, other symptoms break forth. Psychoanalysis, on the contrary, brings the complexes into the full light of consciousness, thus enabling the individual to understand their true nature. He is then in a position to turn the energy in them into more desirable channels. Psychoanalysis, in the strict Freudian sense, involves the use (1) of associative devices to explore the subconscious, (2) of analysis of dreams, and (3) of ordinary mistakes (slip of the tongue, etc.). We wish briefly to consider the first two of these ways of uncovering the complex.

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[1] A third objection was that the repressed energy is transferred to the operator. The individual now fixates upon the hypnotist just as he earlier did upon his father or mother. This fixation is undesirable unless it can be resolved. Hypnosis does not usually permit this, but other methods—*e.g.*, psychoanalysis in the more limited sense in which Freud considers it—do.

Freudian psychoanalysis is essentially a "method of association." It is a way of baring the past or discovering the source of a disorder through the use of "free" and "controlled" association methods. It is a way of breaking down the resistance built up under repression. In the method of free association, the individual is placed in a comfortable position, and is led to discuss his case. In his discussion, every attempt is made to induce a wholly uncritical state of mind. He is told not to attempt to direct the course of the associations—that is left to the operator. By avoiding any particular set or inclination, there is no deliberate (conscious) selection, so that the flow of thoughts is determined largely by hidden (unconscious) mechanisms. It is in this sense that we speak of "free" association. Strictly regarded, the flow is not free; it is definitely determined by the nature of the hidden complexes; by forces of which the individual is unconscious. The patient is urged to "allow his mind to wander freely." Finally, he is warned to relate each thought just as it comes to him.

If the procedure is to be successful, the individual must reveal all. Although he may believe some to be very frivolous and quite irrelevant, he cannot withhold a single thought. Although others may cause him considerable embarrassment or keen pain, they must be expressed. It is especially the latter sort which are found to point to the "sore" spots —the complexes. As his "mind wanders on" under the skillful guidance of the psychoanalyst, his discourse becomes more and more significant. It swings in the direction of the troublesome source.

The operator by an analysis of his records of the associative reproductions is able to detect significant points in the flow. He can see, for instance, that here and there the individual finds difficulty in proceeding. Or, again, the individual may revert repeatedly to a particular topic or trend of thought. Gradually, as the process continues, *the resistance developed under repression is broken*, and the individual again reviews the events which directly contributed to his disorder. Freud's own description of the process is summed up in the following words: "The patient talks, tells of his past experiences and present impressions, complains, and expresses his wishes and his emotions. The physician listens, attempts to direct the patient's thought processes, reminds him, forces his attention in certain directions, gives him explanations and observes the reactions of understanding or denial thus evoked" (*15*).

In the controlled method, a list of words is given the individual.[1]

[1] Jung (*21*, 94) has prepared a list of one hundred words so chosen as to involve the major emotional states and those activities of life most likely to produce complexes. Kent and Rosanoff (*23*, 48) have also developed a list of one hundred words which have been used both with normal and abnormal individuals.

He is instructed to respond to each of them by giving as quickly as he is able the first response word that comes. There are a number of indicators by means of which the operator may judge whether a complex has been struck. Among these are the following: 1. Delayed reaction, 2. Repetition of the stimulus word, 3. No response, 4. Multiple response, 5. Perseveration, 6. Misunderstanding of stimulus word, 7. Change in response under representation of the list, 8. Superficial response, 9. Accessory reactions.

The *delayed reaction* represents a blank mind under emotional blocking. The individual is inhibited in a way quite like that found in stage fright and other emotional seizures. He can think of no response. *Repetition* of the stimulus word signifies that the individual seeks time in order to defend himself. He is fighting for time. The individual may report, even after a fairly long pause, that he is wholly unable to think of anything but the stimulus word. Sometimes the inhibition is complete. The individual may actually say that he cannot think of anything. There is *no response.* At times the individual will act as if he were excited. Instead of one response word he will give several; he may produce a whole sentence in response (*multiple response*). Perhaps he gives the same response to several successive stimulus words. He does not know *why*, but the same response word keeps coming back. Here we say is *perseveration.* The complex is forcing the same word to the front.

A complex may act to cause a person to *misunderstand* or misinterpret the stimulus word. The individual may again and again ask for a repetition of the stimulus words. He simply does not understand some of them the first time, although they are spoken with equal distinctness. Another important indication is the *change in response* when the list is given again. It is assumed that if there is no complex at work, a certain stimulus word (table) that today evokes a response (chair) will tomorrow give the same response. Where changes occur, a complex is assumed to exist. Again, an individual may seek to protect himself by giving obviously *senseless* responses. He names objects about him, or he gives a list of response words each of which is obviously related to the other (riming words), but which have no apparent bearing upon the stimulus words. Finally, the individual may laugh, blush, stammer, cough, clear his throat, or act in other ways indicative of emotional disturbance. It is evident that the chief value of this controlled method is that it indicates the nature of the complex. It does not actually serve to relieve the individual as does the free association method. It is more indicative than it is therapeutic.

As an illustration of the way in which the association method may

be used to reveal hidden troubles and to clear up difficulties, we cite the following cases. The first is that of a young girl who had attempted suicide; the second is that of a young married man guilty of exhibitionism.

She stoutly denied any kind of trouble, and persisted in saying that she had no cause for her attempt. The method of word association produced very marked prolongation of reaction time, and very peculiar reactions to the stimulus words "father," "wish," "walk," "duty," "obey," and "man." Further analysis produced recognition of the fact that she had been anxious to "walk out" with a certain young man, but that her father had forbidden her to do so. As a result, there had been a mental conflict between her desire to go out with the young man and her feeling that it was her duty to obey her father. Not only was this information useful as explaining the attempt at suicide, but the girl's whole life was cleared up. In the second case, investigation by this method showed that the man desired to have a child, whereas his wife, from prudential reasons, declined to take the necessary steps. He was anxious not to urge his wife unduly. Hence arose an obvious mental conflict. The repressed desire in this case expressed itself in an offence of a sexual form (*32*, 82).

To the psychoanalyst the dream is always profoundly significant. It is, so to speak, a pillar of fire by night set upon the road to the unconscious. It is a sign pointing the way to the complex. The dream is assumed to be particularly significant because during periods of sleep the censor is less vigilant than during periods of waking, and consequently permits greater freedom of expression to the unconscious.[1] Just as the controlled association test may be used to reveal the presence of a disturbing condition, the nature of which is unknown to the individual, so the dream stands as an indicator. It is regarded psychoanalytically as the fulfillment of unsatisfied wishes. The dream is the sleeping expression of longings and desires which have not been granted expression in the individual's waking life. Dreams thus have their histories. They are the end result of earlier psychological processes. It is the task of psychoanalysis to start with the content given in dream and proceed backward through the individual's past until the trail ends at the real source of the dream—its true meaning. In this process of tracing down the complex, use is made of the method of free association. The individual in a kind of reverie goes on and on in his recital until the end is reached.

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[1] During waking life the censor ordinarily functions so effectively that the usual hints of the unconscious found in the normal person are the ordinary mistakes (slip of the tongue and hand) and the phantasy or the day dream.

The content of dream shows two major aspects. There is the one which is *known* to the individual. It is the *manifest content* of the dream. This is the part of the dream which we remember and describe from time to time. Here we have the various bizarre, distorted, and often silly characteristics. But these are only the symbolic and outward expressions of deep and unconscious complexes. For the dream, as most know it, is but a symbol—a sign of something else. There is the other aspect which is the hidden meaning. It is the *latent content.* This content is the object of psychoanalytical search. It can be reached only through the use of associative devices. When uncovered, we discover that it is some ungratified wish, some suppressed desire.[1] The dream thus shows two faces. The one is a distorted and disguised expression of the other, which is the truly significant and meaningful one. Through the one we know, by way of interpretation, the other. The distortion in all cases is to be attributed to the activity of the censor.

The wish may secure its disguise through the operation of the two mechanisms of *condensation* and *displacement.* The first is meant to include the fact that elements of various situations or parts of various objects may become fused. In this connection we wish to cite the following illustration from Jones. A woman dreamed that she was called "Hokerring," a combination of smoked herring. "The term smoked herring reminded her of bloater, and of a rather vulgar word in her native language meaning nude, bloot (pronounced bloat). This brought up infantile memories of shyness and a sense of foolishness that were connected with nakedness" (p. 325).

In displacement, the affective element characteristic of every wish may be shunted from an *important* aspect of the wish to an unimportant element, with a resultant distortion in the manifest content.

An element that stands in the foreground of interest in the manifest content, and seems to be the central feature of the dream, may represent the least significant of the underlying dream thoughts; conversely an apparently unessential and transitory feature in the dream may represent the very core of the dream thoughts. Further, the most prominent affect in the dream, hate, anxiety, and so on, as the case may be, often accompanies elements that represent the least important part of the dream thoughts, whereas the dream thoughts that are powerfully invested with this affect may be represented in the manifest content of the dream by elements of feeble affective tone (*19*, 319).

The psychoanalyst regards the dream as a guardian of sleep. It is a

[1] "No wish is able to produce a dream unless it is either unconscious or else associated with an allied unconscious one" (*19*, 344).

way of satisfying the unconscious which, in its striving for expression, would otherwise disturb sleep. Occasionally, when the censor is partially inoperative and consequently unable to withhold the latent contents from manifesting themselves, or to force them into disguised (distorted) forms, we have the very disturbing dreams (the anxiety dream). The censor is overpowered, and in order to defend the organism a waking state is produced. The individual is so shocked by the nightmare that he awakens.

As an illustration of an analysis of a dream that resulted in clearing up a mild psychoneurotic condition, we refer to a case given by Brill. The individual (a young woman) reported the following dream:

"I dreamt that I was in a lonely country place, and was anxious to reach my home in Liconow or Liconor Bay, but could not get there. Every time I made a move there was a wall in the way. It looked like a street full of walls. My legs were as heavy as lead. I could only walk very slowly, as if I were very weak or very old. Then there was a flock of chickens, but that seemed to be in a crowded city street, and they—the chickens—ran after me, and the biggest of all said something like 'Come with me into the dark.' When invited to recite the thoughts evoked by concentrating on the word "chickens," she gave the following: "I could only see the biggest chicken, all the others seemed blurred; it was unusually big and had a very long neck, and it spoke to me—the street recalls where I used to go to school." Then she blushed and laughed, and added: "I had a beau, a pupil from the male department—we used to meet after school hours and walk home together. He was lanky and thin, and the girls used to tease me about him. Whenever they saw him coming they said: 'Belle, here comes your chicken'—that was his nickname among the boys" (*2*, 49).

The sweetheart had later proposed to her, but she had been rather non-committal at that time. He was poor; she had money, but it was invested in Wall Street. Now, when he had become interested in another, she was desirous of an opportunity to accept him. According to Brill, the interpretation of the dream was as follows: The large chicken was the sweetheart. The invitation to "come with me into the dark" represented a wish for a proposal—darkness stands for the mysteries of marriage (to the word "dark" she gave the associations: indistinct—obscure—mystery—marriage). The lonely place represents her unmarried state at the age of 28. She can't get home in "Liconor Bay" (like, honor, and obey) because of the walls (Wall Street obstacles).

In all cases of psychoanalytic treatment, it is evident that the physician does not directly observe the disease. He records the materials as they are given him by the patient, and he observes the manner in which

the individual presents or reproduces the material. From these data he interprets (infers) the nature of the conditions responsible for the trouble.

THERAPEUTIC MECHANISMS

The therapeutic value of psychoanalysis depends, we are told, upon the discovery and the exposure, or the breaking down of the resistance of the complex and upon the removal of the emotional element characteristic of the complex. This emotional discharge may come about through transference, sublimation, or abreaction (which is considered as a form of catharsis). According to most, if not all Freudians, psychoanalysis works through transference and sublimation. In transference, as we have previously remarked, the feelings and emotional fervor of the repression is brought to bear upon the analyst. They are transferred from other persons to the physician. This is one stage in the cure. Here, according to some, is where the process in the case of hypnosis usually stops. This failure to complete the transference is thus regarded by many as one weakness of the latter method. In psychoanalysis, however, the procedure continues until the emotional energy is directed toward the practical affairs of life. When the energy is thus released for the performance of new—and non-neurotic—actions, we have the phenomenon of sublimation, which, according to Coriat, may be defined "as that unconscious conducting of the repressed emotions to a higher, less objectionable and more useful goal." And he remarks that "no patient can be said to have been cured, until he has successfully sublimated" (*6*, 73). The physician, then, plays a very important but temporary rôle in the successful conduct of such cases. Should he remain in the picture, the patient fails to develop independence and consequently retains his neurotic status. In some of the major psychoses,—*e.g.*, dementia praecox—the individual is assumed to be so very much concerned with himself that he cannot make the necessary transference, and so remains unrelieved. In the psychoneuroses, such transference is possible. These are the disorders which lend themselves most readily to psychotherapeutic procedure.

Closely related to the mechanisms of transference and sublimation is that of abreaction. It assumes, as we know, the existence of an emotional content which "charges" a system of ideas and because of which the behavior of the individual is disturbed. According to those psychoanalysts (not strictly Freudian) who use the method, an additional assumption,—*viz.*, that the reliving or the working off of this emotion is curative—is made. It frees the repression; it removes the symptoms by

discharging the underlying repressed condition. The energy previously diverted toward the production of signs of disease is again at the disposal of whole personality. Brown remarks that in his opinion "it is the most helpful therapeutic process in dealing with the majority of war psycho-neuroses" (*4*, 125). To make clear the method as he uses it we wish to cite the following illustration, which Brown describes as a crucial case of the value of abreaction, or the removal of repression and the working off of emotion under hypnosis.

It is the case of a gunner who was admitted to the hospital where I was working, after he had spent two years in military hospitals of different kinds. He was suffering from a tremor of the right hand, dating from the time when he had been blown up at Ypres. He did not remember anything more until he reached the hospital, and the memory of this interval had never been recalled to him by any of the doctors he had previously seen. I sent him to sleep—that took just about three seconds—and then suggested to him that he should live again through the experience of Ypres. He did so, and began to shout out all sorts of things which showed what had happened at the time. German shells were falling nearer and nearer to the gun-pit. He was apparently serving the gun, and some one else was handing him ammunition, and this person had evidently lost his head, for my patient shouted out: "What the —— do you mean by pulling the —— pin out of that —— fuse?" Then I noticed that he was moving the handle with his right hand; his hand began to shake violently, and soon he was shaking all over, but especially in his right hand. Then he suddenly became absolutely still. I suggested to him that he would continue to remember all that he had just gone through and then woke him up. He looked at his hand, which was absolutely still, with amazement, and expressed his gratitude, but his mind still appeared somewhat confused, so I told him to go and sleep it off. An hour later he came back and told me that he had not been to sleep, but that he had been thinking it all over. He knew everything that had happened, and told me that he had not been suffering from shell shock, but from gun shock. His gun had been blown up, and the emotion which this experience had excited in him had been bottled up for two years, with the result that he had suffered from this tremor in his hand. The next morning he was able to shave himself with an ordinary razor, for the first time since his illness (*4*, 21).

In the opinion of McDougall, the real mechanism involved in producing relief in such psychoneurotic cases as the above is the reintegration of the personality through the removal of a dissociated condition. The physician actually faces, in such cases, a form of amnesia. And his real task has to do with returning this split-off part to the remainder of the personality so that it functions as a whole. Let us consider his actual statement in this matter.

The memory of the shock and of the preceding incidents was dissociated, *i.e.*, the corresponding cortical dispositions were disconnected from all others of the higher or cortical levels; but they retained their connection with the fear center in the basal ganglia; and, through this, also with the motor centers of the right arm. The cortical disposition with the emotion center formed a couple of circular self-sustaining activity, the excitement of which found an outlet more or less continuously through the nerves of the right arm, whose motor centers are also in partial dissociation and form part of the dissociated system. I suggest that the moment at which the tremor ceased was the moment at which the dissociation was overcome. The emotional energy of the system, instead of remaining confined to the one narrow system, was then able to take a more normal course, spreading over to many cortical dispositions; the mental accompaniment being the realisation of the terrifying incident in its past setting and in its true relations to present circumstances. Hence the return of power of voluntary control, *i.e.*, the control of the whole psychophysical system over the dissociated part" (*24*, 459).

BIBLIOGRAPHY

1. Bernheim, H., *Suggestive Therapeutics.* 1889.
2. Brill, A., *Psychoanalysis.* 1912.
3. Bramwell, J., *Hypnosis, Its History, Practice, and Theory.* 1907.
4. Brown, W., *Psychology and Psychotherapy.* 1921.
5. Conklin, E., *Principles of Abnormal Psychology.* 1927.
6. Coriat, I., *Abnormal Psychology.* 1914.
7. ————, *What Is Psychoanalysis?* 1917.
8. ————, *Repressed Emotions.* 1920.
9. Dubois, P., *The Psychic Treatment of Nervous Disorders.* 1905.
10. Dunlap, K., "Sleep and Dreams," *Jour. of Abn. Psychol.*, 1921, *16*, 197.
11. Emerson, L., *Nervousness.* 1918.
12. Ewer, B., *Applied Psychology.* 1924.
13. Franz, S., *Nervous and Mental Re-Education.* 1923.
14. Freud, S., *A General Introduction to Psychoanalysis.* 1920.
15. ————, *Introductory Lectures on Psychoanalysis.* 1922.
16. Hart, B., *Psychopathology.* 1927.
17. Janet, P., *Psychological Healing.* 1925.
18. ————, *Psychotherapy.* 1924.
19. Jones, E., *Papers on Psychoanalysis.* 1913.
20. ————, "The Action of Suggestion in Psychotherapy," *Jour. of Abn. Psychol.*, 1911, *5*, 217.
21. Jung, C., *Analytical Psychology.* 1916.
22. ————, *The Theory of Psychoanalysis.* 1915.
23. Kent, G., and Rosanoff, A., "A Study of Association in Insanity," *Amer. Jour. of Insanity*, 1910, *67*, 48.
24. McDougall, W., *Outline of Abnormal Psychology.* 1926.
25. Mitchell, T., *The Psychology of Medicine.* 1921.
26. Moll, A., *Hypnosis.* 1897.

27. Münsterberg, H., *Psychology, General and Applied.* 1914.
28. ————, *Psychotherapy.* 1909.
29. Pfister, O., *Psychoanalysis in the Service of Education.* 1922.
30. Prince, M., "The Mechanism and Interpretation of Dreams," *Jour. of Applied Psychol.*, 1910, *5*, 139.
31. ————, *The Unconscious.* 1921.
32. Smith, M., *The Psychology of the Criminal.* 1922.
33. Walsh, J., *Psychotherapy.* 1913.
34. Williams, T., *Dreads and Besetting Fears.* 1923.
35. Young, P., "An Experimental Study of Mental and Physical Functions in the Normal and Hypnotic States," *Amer. Jour. of Psychol.*, 1925, *36*, 214.

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