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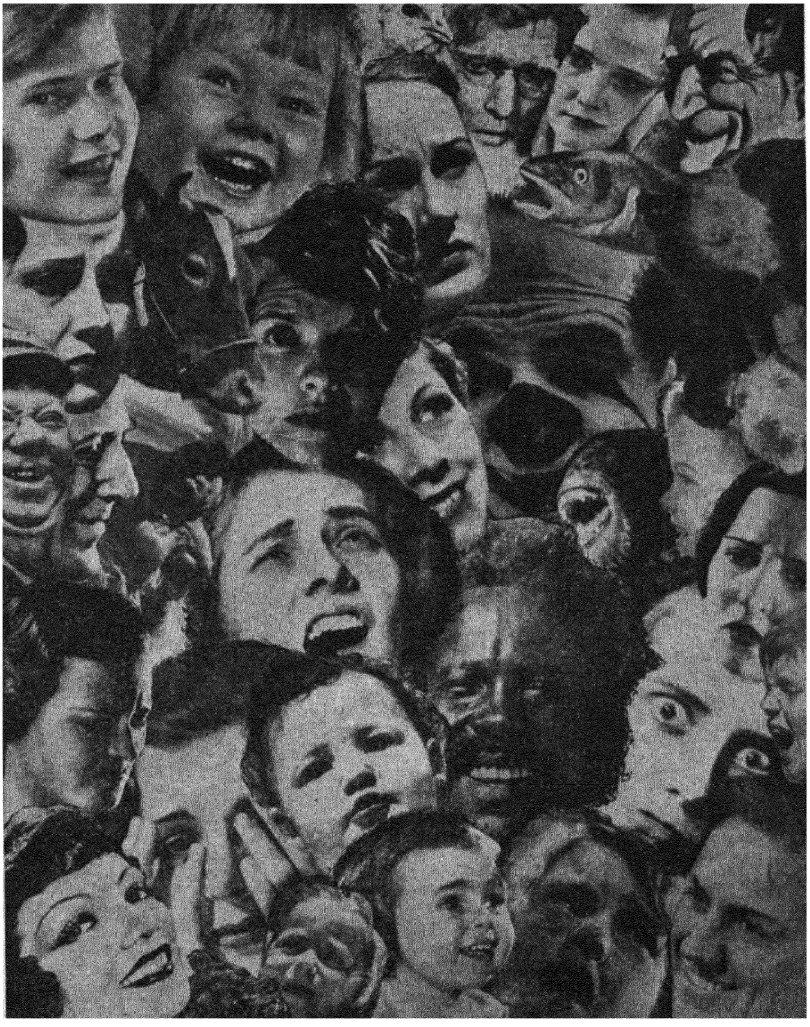
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(Frontispiece.)

A photomontage mounted by the author to show the great variety of facial expressions.

THE PSYCHOLOGY OF FEELING AND EMOTION

BY

CHRISTIAN A. RUCKMICK, PH.D.

Professor of Psychology, University of Iowa

FIRST EDITION
FOURTH IMPRESSION

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PREFACE

To anyone who is conversant with the vast literature on the various phases of the affective life a treatise on this subject may appear to be a presumptuous undertaking. To one who is intimately working in this area it may even seem improbable that the stage can be set for any definite organization of the available materials. There is, on the one hand, a wealth of data scattered over a large territory, and there is, on the other hand, an obscurity of focus which has led to a confusion of results.

A perusal of the literature will reveal numerous theoretical writings and a far-flung line of research on many phases of feeling. But the serious student of systematic psychology may well stand aghast at the lack of standardization of terms, at the failure to obtain any substantial agreement as to what the feelings or the emotions are from a scientific angle, and at our lamentable inability to apply what we have learned from carefully controlled investigations in this sector of the mental life.

That there is a considerable amount of interest shown within and without the confines of psychology can not be denied. The demand for results far exceeds the supply of experimentally proved data. Educators, criminologists, clinicians, sociologists, artists, and many others are evincing an increasing avidity for facts concerning the emotional responses of the human being. Psychologists themselves are at the same time well aware of the paucity of facts regarding the affective reactions of the mind. They are as anxious to bridge this gulf in the complete understanding of human experience as others outside their professional ranks are ready to utilize the results thus made available. It must be admitted at once that for a long time effective research was hampered in part by a greater concentration of effort in the direction of the cognitive processes and that, therefore, in competition the affective life was neglected. In part, too, resisting attitudes had to be overcome. We are now, however, launching a strong attack on this group of mental processes and gradually light is being thrown into these recesses of human experience.

The author has accepted the challenge which such a treatise inevitably presents. He believes that at this time both the professional and the nonprofessional public may be benefited by at least a tentative

systematization of theoretical contributions and experimental research. If the high degree of technical standardization which exists in other more thoroughly worked fields does not yet here obtain, his answer is that a treatise of this sort may help in bringing it about. Certainly the historian knows that, in the area of memory, of reaction time, of perception, and of other types of mental processes, only persistent endeavor has led to anything like partial theoretical agreement and tentatively accepted facts. The author, therefore, pretends to do no more than to pass judgment on what has been done, to indicate where serious gaps occur, and to make such order as is possible under the present circumstances. Certainly no broad integration of the affective life has been available for several decades. Many courses on the psychology of the emotions are, nevertheless, being given in various institutions without the aid of a systematic treatise on the subject. Over a period of more than a decade the author has been responsible for a number of major and minor studies on the emotions which have already been published. While he, therefore, assumes no great competency in the field, he nevertheless feels called upon to coordinate this material with other research, done outside his laboratory. Presentation in this form will afford much needed criticism and review in the direction of effective stimulation toward further investigations of our own. It is also the author's hope that the book may lead other psychologists toward more intensive productivity in the field of the emotions.

The book is designed to follow no particular point of view. It tries to evaluate facts and theories supplied from many types of interpretation. Although a central phylogenetic theory permeates nearly all the chapters and although this theory is offered principally from the experiential standpoint, it is widely correlated with neurological conceptions. This does not involve any commitment as to the form of the relationship between mind and body except to affirm such a relationship from a broad angle of regard. If the reader is at all inquisitive as to the author's preference and if his understanding of the presentation may be in any way aided, the author confesses to a leaning toward a double-aspective interpretation of the relationship.

It is not possible in a book of this compass to cite by chapter and verse all contributions which furnish support to the statements made. In that matter the author has been somewhat more prolix than is commonly the practice in textbook writing. Such a procedure was followed because the book will probably find its best outlet in intermediate and advanced classes where an elementary knowledge of psychology may be presumed but where further reading in the sources

may also be invited. This is perhaps equally true of professional groups outside psychology who may find it of service. Many sources have had, nevertheless, to be omitted. The author takes full responsibility for the selection of the references that he has considered meritorious and applicable.

The author's obligations are numerous and widely scattered. Thanks are due to advanced classes in systematic psychology, which for many years have furnished the battleground for frequent arguments and criticisms concerning points of view. Graduate candidates for the doctorate have made many valuable suggestions in several of the chapters. The author dedicates the book to no one because he does not wish to make any one person responsible for his possible intellectual errors. Inspiration has been derived from a quadruple source: From the master mind of the late Professor E. B. Titchener the author has inherited many ideals of scholarly writing and terse Anglo-Saxon expression, together with a persistent attempt at logical and historical systematization; from Professor Madison Bentley he has learned self-criticism, cautious statement of tentative fact, and circumspect evaluation of basic theory; from the late Professor Mary W. Calkins he has assimilated to some extent incisive and argumentative thinking combined with the high appreciation of classical authorities; from his colleague, Dean Carl E. Seashore, he has derived the incentive of furnishing new ideas and of pushing on toward new realms of research. Under his leadership the author has been given ample facilities for carrying on experimental investigations and for writing this book. The Committee on Educational Research of the Payne Fund, now the Motion Picture Research Council, should receive acknowledgment for research funds with which inquiries still under way in connection with the motion pictures were subsidized. The author's wife has read many of the chapters and has offered valuable assistance in other ways. Mrs. Shirley Brooks Buxton made the preliminary stenographic copy for the early chapters and Miss Fern Barr and Miss Maurine Rogers assisted in preparing the final draft for the printer. Their aid is also acknowledged in preparing the Name Index and in lending other clerical assistance.

Although the frontispiece and many of the drawings were made by the author, most of the photographs have been copied by the university photographer, Mr. Frederick W. Kent. The author's thanks are also given to Professor J. P. Guilford for the use of a photograph of his facial model, to Professor W. Elmer Ekblaw for his courtesy in furnishing the photograph of the Eskimo girl, to Dr. Nancy Bayley for permission to use the picture of the crying infant, to Mrs. N. N. Kohts for her

kindness in providing me with a new photograph showing anger in the chimpanzee, to Dr. Chester W. Darrow and Mr. John A. Larson for their assistance in supplying illustrative materials and authentic interpretations of their experimental results. The following publishers have also been gracious in allowing diagrams to be copied from their copyrighted books and periodicals: The Clark University Press, Thomas Y. Crowell Company, Longmans, Green & Co., The Macmillan Company, The Psychological Review Co., D. Van Nostrand Company, Inc., and D. Appleton-Century Company, Inc. The C. H. Stoelting Co., Arthur Petzhold, and E. Zimmermann have been helpful in furnishing cuts and in allowing the author to use other copyrighted material.

C. A. R.

IOWA CITY, IOWA,
April, 1936.

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PSYCHOLOGY OF FEELING AND EMOTION

CHAPTER I

A SURVEY OF THE AFFECTIVE LIFE

Unbending decider! Pedagogue in phrases! Furred reasoner! Thou inquirest after the limits of the human mind—they are at the end of thy nose.

Voltaire, "Mind" in *A Philosophical Dictionary*

1. The Scientific Aspect of the Affective Life.—How frequently the emotions are with us everyone knows. Day in and day out they come, in one form or another, sometimes as unexpected visitors and sometimes as invited guests. It is not, therefore, a paradox but a truism to say that the portrayal of the emotions or what, in a broader way, may be called the affective life, is likely to stir up one or more affective responses in the mind of the student who is brought face to face with an intimate discussion of the subject. Trained from the earliest days to repress his feelings, he probably will become interested in and to some extent inquisitive toward a presentation of this phase of experience. What! an entire book on the emotions? A vast vista of possibilities is opened up to the imagination; an array of fascinating exhibits lies before. Satisfactions but also disappointments are perhaps in store for such an individual, whether he be of a scientific or of an appreciative turn of mind. The scientist, in whatever field he has been working, may be baffled by the great complexity of the problem and the accompanying scarcity of precise facts. The lay reader, an adventurer in this newly explored territory, may be deprived of the pleasure coming from repeated exclamatory appraisals of the beautiful and ugly things along the road. Even that incomparable scholar, William James,[1] who is recognized as one of the American pioneers in psychology, remarked with apparently considerable feeling, "but as far as 'scientific psychology' of the emotions goes, I may have been surfeited by too much reading of classical works on the subject, but I should as lief read verbal descriptions of the shapes of the rocks on a New Hampshire farm as toil through them again."

[1] *Principles of Psychology*, Vol. II, p. 448, 1890.

Happily since this sentence was written, over forty years ago, much of importance from the point of view of experimental psychology has been accomplished. What is more, our attitude to the subject has undergone tremendous changes. But before we consider these matters even in a preliminary way we have to understand clearly just what we are seeking to do. When you visit a country, especially one which you have heard or read much about, it is better to plan ahead the routes which you are to take and to prime yourself in advance as to climatic conditions, the customs of the people, the language and dialects which express their ideas, the currency of the realm, the modes of transportation which you are to use, and the unusual sights which you expect to see. We are setting out to learn what psychology has to say by way of discovery and investigation in the domain of the emotions. What are the emotions? What is psychology? What is the scientific attitude? What has it revealed up to the present in this particular area of the mind? How does psychology explain both the usual and the unusual events in the mental life? These and scores of other vital questions must receive at least a tentative answer before the journey is well under way.

One of the difficulties is characteristic of the whole field of psychology as it is understood by the average well-educated individual. If you begin the study of chemistry you probably have not many notions about it. The same is true of most of the other natural sciences, But not only has the beginner heard much of psychology that he may have to unlearn, but his experiences and responses which form the subject matter of psychology have been with him from the earliest days of childhood. He may therefore believe that he is fairly familiar with the topics under discussion. The facts that lie so vividly before him lack coordination. They have only incidentally been compared with those from other sources, from other individuals, and from other conditions of life in the entire span of the animate world. Above all, they are probably dressed in the flowing raiment of personal interest and appreciation. Before he can make headway, therefore, in terms of a ready interpretation of what are still foreign, though somewhat familiar, surroundings, he must gain the attitude of the scientist, learn to understand his language, and aim to follow his customary procedures. All told, a general glance at the map of the mind and some survey of the means of approach to and transportation through this territory will be helpful here.

2. The Scientific Attitude.—When life is so full of personal needs, so rich in the warmth of friendly associations punctuated only by occasional unfriendly bickerings, so varied in the coming and going of

intimate experiences, it is much to ask that all this be laid aside and that everything be considered from an impersonal and impartial point of view. The glory and glamour that are the blood of life must be seen through the objective eye of science—at least for the time being. In scientific investigations poetry and romance are alien to the cold scrutiny of the experimenter in order that truth shall prevail. Quite to the point here are the magnificent words of Goethe in *Faust:*

> He who would study organic existence
> First drives out the soul with rigid persistence;
> Then the parts in his hand he may hold and class,
> But the spiritual link is lost, alas!

Goethe could talk with authority here because, in addition to being one of the world's most gifted poets, science gives him credit for his unique contributions to comparative morphology in tracing the evolution of the bones of the head.

But while the finiteness of the human mind requires at first an analytical and impersonal approach, the final synthesis and synopsis must not be overlooked. You may learn much by taking a watch apart; but you must crown your work by being able to put it together again. At that moment you can better appreciate the nature and function of the whole. Thus it is with any aspect or, indeed, with the whole of the mental life. Under these circumstances scientists the world over and in every branch of knowledge not only usually gain a deeper insight into the real essence of things, but invariably find that the boundaries of knowledge have expanded to such an extent that always more mystery remains to fascinate the imagination and to provoke enthusiasm toward still further research into the world of the unknown.

This is the situation in regard to the affective or emotional experiences. At first it seems a pity to analyze love, to dissect reverence, to mutilate fear, and to pick apart scores of other deep-seated emotional responses. The answer is that for centuries these responses and experiences have been described and catalogued superficially and appreciatively as one might write books about birds seen through glass in museum cases. That is one way of doing it. Until such objects of nature were described and photographed intimately in their customary haunts, until minute inspections were made of their internal structures and functions, and until this new knowledge was compared with facts concerning other related species, the story was incomplete and one-sided. Thus we have vastly enriched our knowledge of the emotional life of man and other animals, not by a casual inspection

and logical inquiries, but by scientific attacks and intimate analyses under all sorts of conditions. Throughout, then, we must be mindful of the scientist's attitude. He is a systematic seeker after knowledge. It is not his to praise or to condemn; it is his only to know and to understand. But the end is not yet in sight: we have made only a beginning. The materials in hand, however, are so significant that a general organized summary of the work is now possible and an enlightened view of this aspect of the mental life is within our grasp.

The field of the emotions, furthermore, is particularly apt to be overrun with prescientific and unwarranted assumptions that have been detrimental not only to psychology itself but to the various practices of an applied nature. We are psychologically today in a stage of development which is still swathed in swaddling clothes. It is so hard to be objective about things that have so long been entirely subjective. As we have already noticed and for reasons which we shall understand more fully later on, the emotional life is putting on a belated appearance on the scientific stage. And yet there is an enormous clamor for facts and still more facts from those who could well use them if these were within easy reach. This lack of accurate material on the one hand and the pressure for palpable products on the other have led to an ever increasing influx of writings on the subject which are often misleading. The experimenter in this field is therefore still continually on his guard lest the results of research be snatched from under his nose and blazoned forth in bold print. But he must also beware of exaggerating his own work or overdrawing his conclusions.

3. The Affective Aspect of Experience.—The history of thought reveals the fact that from the earliest times what we have called the affective side of the mental life has not only been noticed but often been given a prominent place in the interpretation of natural phenomena. This is not surprising when we consider that the early philosophers and thinkers projected their own experiences into the world at large. Their attitude has been called *anthropomorphic* or *metempsychotic* or *animistic*. By the first term we mean that the subjective percepts, ideas, and feelings of the individual are naïvely implied in the inanimate objects about him, just as the young child sometimes gets angry at the table against which he has struck his head and is much appeased when his parent tells him to "spank the naughty table."

The entire world is thus at first seen through the medium of the inquirer's own experiences. Manlike gods are created and the world is explained in terms of forces that take on human characteristics. The form of man is impressed mentally and physically on all types of surroundings. When, however, a differentiation between the mental

world and the physical world begins and there is still a tendency to clothe the world in human form, especially when it is believed that the human soul passes from one body to another, as in the doctrine of the transmigration of souls, then we say that metempsychosis takes place. Animism is a still broader concept which suggests not so much the mental side of the world as the vitalistic or life-giving principle which then becomes the source of all energy in the world. Everything is alive. Life forces are everywhere, even in the material objects. The ascription of mobility and vitality to all cosmic matter indiscriminately and without any real distinction between physical substance and life has been termed *hylozoism* (*hylo* wood or matter + *zoos*, alive). The belief is a crude form of animism since it takes this identification for granted without once questioning the difference between animate and inanimate forms or realizing that such a distinction can exist.[1]

It is therefore not strange that we find instilled into many religions and cosmologies the essence of what man has felt within himself. Confucianism centers its influence around *shu*, the sign of the heart which is expressed in the golden rule. Brahmanism takes blissfulness or *ananda* into partnership with reflection and being as one of the three essential aspects of its deity. The Koran embraces the concept of Rahmān as the god of compassion in contrast with the torments inflicted by a wrathful avenger. Shintoism extols reverence for ancestors. Our own New Testament replaces an angry and exacting Jehovah with a god of love. So, too, the Greeks repeatedly described their gods and their heroes in terms of strong feelings. The *Iliad* begins with the dramatic command, "Sing, O Goddess, of the consuming wrath of Achilles, son of Peleus, that has thrust countless woes upon the Greeks." The magnificent war lord Agamemnon was so perturbed that "his mighty midriff, black on both sides, heaved with anger, and his two eyes seemed to shine forth like fire." We read that Apollo's "heart burst with anger." Among the early Greek philosophers there is Anaximander, who six centuries before Christ made love one of the indestructible principles of the cosmos, while a century later Empedocles reduced the universe to earth, air, fire, and water which were attracted to each other by love and repelled by strife.[2]

[1] See W. Windelband, *A History of Philosophy* (trans. by Tufts), 2d rev. and enlarged ed., p. 32, 1914.

[2] Although separated by several millenniums this statement is not in principle so far removed from that made several years ago by R. A. Millikan, in an address before the Society of Chemical Industry, when he declared that in addition to the positive and negative electrons, the fundamental elements in the world are helium, oxygen, silicon, and iron. But it is significant to note that in this partnership of universal

We are not here concerned with an historical survey of the place which the emotions have held in the mind of thinking man. In the next chapter this will be considered much more in detail. Suffice it for the present simply to point out that from the earliest centuries and throughout the world the presence and importance of the affective life were recognized. Even in the latter half of the last century at least two prominent psychologists, Alexander Bain[1] and James Mark Baldwin,[2] made it one of the four major rubrics under which the mind was discussed. One of the strange anomalies in the situation, however, is the scarcity of systematic treatises on the subject. An outstanding exception is Theodule A. Ribot's *The Psychology of the Emotions* which appeared toward the end of the century.

That the human and lower animal mind is to some extent emotional has been repeatedly demonstrated and commented upon. We need only scan the short space of an hour of our own lives to note the frequency and sometimes the intensity of its appearance. Often the facts of life are ignored because of their commonplace occurrence. It has been said that blue is not mentioned in the Old Testament because of its ever-presence in sky and water. Thus, unless our attention is called to the matter, we may gain the impression that at least in our civilized day reason holds sway and emotions have receded to the background. But such is not the case.

We may safely assume that none of the categories which we find as chapter headings in our textbooks are sharply demarcated in actual experience any more than are the stamens, pistils, sepals, petals, and the like in the full-blown flower. Only close inspection and sometimes arbitrary distinction reveal them. So it is with man. Somehow we have gained the notion that man is a rational being and so we conclude that reason sways the life of man. True, civilization and the consideration of others in a social system have led us to repress, and often to hide, our emotional attitudes. But they nevertheless exist and often come to the fore. In fact it is significant to note here that one of the most recent treatises on the psychology of reasoning[3] begins by tracing the rôle of the affective processes in intellectual functions. The point is that one of the chief characteristics of the affective phase of the mental life is its tendency to penetrate deeply into all other

---

causes iron is the only stranger, while love and strife have turned into positively and negatively charged electrons!

[1] *The Sense and the Intellect*, 1855; *The Emotions and the Will*, 1895.

[2] *Handbook of Psychology: Senses and Intellect*, 1890; *Feeling and Will*, 1891.

[3] E. Rignano, *The Psychology of Reasoning*, 1923.

aspects of the mind. Only in the abstract and for purposes of separate treatment can we say that reason is entirely devoid of affective coloring.

4. The Rôle of the Emotions in Everyday Life.—It may therefore be profitable for us to consider briefly the important place that this section of experience holds in the realm of life. Subtract the emotional



FIG. 1.—Facial expressions from the bleachers. (*Courtesy of the American Magazine and Paul A. Hesse.*)

element from religion, literature, and art and there would be left the merest dross, an utterly meaningless mass of symbols and responses. Emotionless, man could not produce poetry, music, the graphic arts, or any of the splendid products of a refined culture. The generous sweeps of the imagination that have brought forth romantic movements in the world's history, the noble aspirations of the intellect that have led whole peoples to seek a higher life, the tremendous activities of organized groups which have spread the best tokens of their civilizations to other lands, the splendid achievements of individual pioneers, adventurers, craftsmen, artisans, composers, inventors,

scientists, and spiritual leaders, would never have come to pass in an emotionless world.

Even if we glance at the most humdrum activities of everyday life, at the prosaic and routine doings of the average man, woman, and child, the constant force of an internal drive, emotionally colored and fired, forms a real and essential factor in the business of keeping alive. Emotions have sweetened the life of the aged and infirm to encourage them to continue their feeble existence, just as the lack of motivation has led many to an early death through suicide and catastrophe. Loss of an emotional interest in matters of this world has almost always been followed by gradual degeneration of mind and body or by drastic acts of self-destruction. Conversely, a self-initiated and renewed attempt to assume a more lively and enthusiastic attitude has pulled men out of the mire to a firmer and freer footing and a chance to live more fully.

But, of course, this is only a part of the picture. It is stressed first because, like many obvious things, it is often overlooked or forgotten. Emotional motivation has led the world on to better things; it has made us realize some of the best that is within us and has made us appreciate some of the finest of nature's products around us; it has caused us to recognize the noble acts of our fellow men. Like so many natural forces, however, it may easily lead and has often led to destruction. A passionate outburst may cause one man to slay another. It has caused misguided religious enthusiasts in former days to burn scientists and philosophers at the stake and today to torture mentally those who see and say truths in advance of their time. Savage warfare and pillage are provoked through emotion; the meanness of man to man is its offspring; cut-throat competition is fostered by it. Lust and love are from the same litter. Plato's simile, though very old, is still full of meaning. Man is like the charioteer trying to make progress by driving two steeds: one light, alert, spirited, and sensitive, the other dark, unruly, stubborn, and lazy. Emotion was a dynamic driving force with energy to spend. The problem was so to harness it that it would pull in the right direction. It was one of the forces of nature that called for expert handling and guidance.

There was a view common in the Middle Ages and pictured vividly by St. Francis of Assisi. The emotions had much to do with our bodies, especially those emotions that showed an animal heritage. These were the province of the devil and through them the devil gained power over us.

But before we can direct the force of an emotion we must learn to understand it. Understanding it does not mean despising it, or

denying its existence, or dishonestly neglecting it. The world's history has shown that all such treatments have been both futile and foolish. Judging by a comparison with other problems, like memory, perception, and action, we have made a very late start on the task of knowing what emotions really are. But the work is in progress and noteworthy advances have been made in the interpretation of the emotional responses of man and the lower animals.

Sometimes great political leaders have been remarkably astute, not only in gauging the emotional responses of the people who followed them, but in analyzing their own emotional attitudes. One of the fairest biographers of Frederick the Great[1] tells of an amusing episode in the military life of that national figure. When toward the close of the Seven Years' War he embarked on what seemed to be a hazardous enterprise against the Austrians, he gave strict orders as to what was to be done in case of his capture in the face of a depleted treasury and an almost exhausted nation.

"I forbid your showing the slightest consideration for my person or paying attention to what I might write to you while I am a prisoner. . . . Everyone is then to obey my brother who . . . is pledged at the cost of his life that neither territorial secessions nor ransoms shall be offered to buy my freedom, and that the war will be continued just as though I had never existed."

He knew the human mind well enough to realize that his emotional attitude would very likely change with his fortunes and that even a well-disciplined reason might be biased when emotional pressures were brought to bear.

Quite lately the remarkable influence of fear as an underlying motif in the national welfare of whole peoples was splendidly portrayed in the publication of Sigmund Freud's newest book.

"The policy of England was based on the security guaranteed by the seas which encircle her coasts. The moment Blériot flew over the Channel in his aeroplane, this protective isolation was broken through; and on the night on which, in a time of peace, a German Zeppelin made an experimental cruise over London, war against Germany became a certainty."[2]

So we see how subtle and yet how strong are the emotional forces that permeate the fabric of the mind: *subtle*, because often we are not fully conscious of them or, if we are conscious of them they may not be actually or wishfully realized; *strong* because they constitute a biological

[1] M. Goldsmith, *Frederick the Great*, p. 171, 1929.

[2] *New Introductory Lectures on Psychoanalysis*, p. 243, 1933.

foundation of long development at the bottom of our recently overlaid intellectual life.

5. Some Extreme Examples of Affective Experiences.—While we could exhibit many more instances of the fundamental affective undercurrent to what James classically called 'the stream of thought' in everyday life, we are often much more impressed by some extreme cases which emphasize or exaggerate the normal occurrence. For such material we have to go to abnormal cases. Störring[1] once said that here nature has performed experiments that we could not or would not undertake to make. If the normal person can be both exceedingly cool and reasonable and tremendously excited and irrational, let us see what we can gather from descriptions of those who go much farther toward these extremes. From a survey of the whole range we may obtain a better conception of the altitude at which normal human beings find themselves. The clinician is quite concerned with this phase of the cases under his care because he sees the great leverage that might be his if he had more reliable information on the subject.

Let us take some concrete cases. A director of a large psychopathic hospital once told a group of psychologists that, whenever a new textbook in psychology appeared, he invariably turned to the chapter on the emotions, only to face the usual theoretical discussions and to meet with habitual disappointment. Yet in the pathological field so much depends upon a true readjustment of the emotional nature of man. Especially when pathological conditions result in criminal tendencies and often in actual criminal misdeeds, the clamor for more basic knowledge is great. Of course, the scientist is not thereby committed to any basic theory of punishment. No amount of discovery of the elemental facts concerning the emotional life, no amassing of data relating to the functions of the endocrine glands or the basal ganglia, no intrinsic study of other underlying physiological conditions, whether induced by inherited strains or environmental factors, would permit us to relieve the malefactor of responsibility for maladjustment or crime. It takes more than science to do this. It takes a philosophy of life and certain premises of logic to work from the discovered facts to their application in a moralistic universe.

In a recent conversation with one of their youthful playmates the fundamental characters of Leopold and Loeb were discussed. The question was raised as to whether these two boys were not rather emotionally cold, not only when they killed the Franks boy, but also in their general behavior. This playmate said that the diagnosis was

[1] G. Störring, *Mental Pathology in Its Relation to Normal Psychology* (trans. by Loveday), pp. 7 f., 1900.

correct; the normal emotional responses were either thoroughly warped or entirely lacking. One must conclude, therefore, that their intellectual brilliancy was one-sided and in this case had led to a repression of the affective life. Something of the same sort might be said of the kidnaper of the Lindbergh baby, who could lift a sleeping infant from his crib and shortly thereafter be responsible for that infant's untimely death. All such cases are, according to Ribot,[1] examples of the 'dissolution' of the 'life of feeling' as found among 'abnormal and morbid characters.' He himself cites the case of a "magistrate, observed by Esquirol, who, though perfectly lucid in mind, had lost all sensibility, and was 'as indifferent to his family and everything else as to a theorem of Euclid.'"

But the phenomenon is not new to our day. Sir A. Conan Doyle describes his hero, Sherlock Holmes, in a similar fashion.

"It was not that he felt any emotion akin to love for Irene Adler. All emotions, and that one particularly, were abhorrent to his cold, precise but admirably balanced mind. He was, I take it, the most perfect reasoning and observing machine that the world has seen; but as a lover, he would have placed himself in a false position. He never spoke of the softer passions, save with a gibe and a sneer. They were admirable things for the observer—excellent for drawing the veil from men's motives and actions. But for the trained reasoner to admit such intrusions into his own delicate and finely adjusted temperament was to introduce a distracting factor which might throw a doubt upon all his mental results. Grit in a sensitive instrument, or a crack in one of his own high-power lenses, would not be more disturbing than a strong emotion in a nature such as his."[2]

And one of our most recent writers of inimitable character sketches, Gamaliel Bradford, writes of Talleyrand as follows:

"The youthful repression, the clerical isolation, produced an artificial stolidity, a habit of concealing, repelling, resenting emotions which finally disposed of them almost entirely and even showed in what seemed pretentious comment, as in his account of his visit to the death strewn field of Austerlitz with Marshal Marmont, when the Marshal could not withhold his tears, 'but as for me, I assure you, it had no effect upon me whatever.'"[3]

Talleyrand's own account of the process of thwarting and stemming his emotional life is well portrayed in his letter to Madame de Rémuscat:

[1] T. A. Ribot, *The Psychology of the Emotions* (trans. in three editions from *La psychologie des sentiments*, 1896), p. 416, 1897.

[2] *Adventures of Sherlock Holmes* (A Scandal in Bohemia), p. 1, 1920.

[3] *Saints and Sinners*, p. 150, 1932.

"You see, situated as I was, I had either to die of distress or to toughen myself so as not to feel the lack of what I could not have. I fell back on the toughening, and I am willing to agree with you that it was a mistake. It would perhaps have been better to suffer and to retain my faculty of feeling a little more deeply; for the indifference of the soul which you reproach me with has often disgusted me with myself. I have never loved others enough; but I have never loved myself enough either; and I have never taken enough interest in myself."[1]

Here we have examples of greatly reduced emotional expression and probably, though not certainly, an equally great reduction of the emotional mental life. Whether or not this is a safe inference remains to be seen. There are many instances on record which are sufficiently accurately analyzed to show that external expression sometimes belies or belittles the actual mental condition. Later on we shall discuss this subject in greater detail. All we need to note here is that from the actual accounts given we can surmise a vast difference in emotional constitution, which is not only a scientific problem but in many cases a problem to be practically reckoned with. It appeared as a problem in all periods of the world history but perhaps never as much as it does today. From many angles we have put a premium on the development of the cognitive functions of the mind, on appeals to the senses, on perceptual training, on intellectual exercise and brilliancy; in short, on what we please to call human intelligence. The education of the emotional life of man in all its ramifications has been neglected or treated with scant courtesy.

On the other side of the picture we have the excessive portrayal of the emotional life, accompanied also, we believe, by actually pronounced emotional consciousness. Such instances are constantly met with in our psychopathic institutions, especially in hysterical cases but also in manic-depressive and other types. Take, for instance, the case cited by Carpenter. It was related to him by his friend, Dr. Howe of Boston, who was well known as the instructor of Laura Bridgman:

"A half-idiotic youth in the Lunatic Asylum of that place, was the subject (like many in his condition) of frequent and violent paroxysms of anger; and with the view of moderating these, it was suggested that he should be kept for some time every day in rather fatiguing exercise. Accordingly he was employed for two or three hours daily in sawing wood, to which task he made no objection; and the paroxysms of rage never displayed themselves, except on Sundays, when his employment was intermitted. As it was considered, however, to be better for him to spend a part of that day in sawing wood, than to be irascible during the whole of it, his occupation was continued through

[1] *Ibid.*, p. 155.

the entire week, when he became completely tamed-down, and never gave any more trouble by his passionate displays."[1]

The abnormal emotional condition of hysterical cases is perhaps best described by Fox:

"The emotional crises of hysteria vary in character and in severity from simple attacks of 'hysterics' and of syncope to seizures which resemble one or more of the periods of clownism, emotional attitudes, and delirium of the old hystero-epilepsy. The mild types are characterized by an emotional display of uncontrollable laughing and crying. When the attack results from anger the patient may destroy objects which happen to come under her observation. Ordinarily, such crises are looked upon as reprehensible outbursts of temper."[2]

But probably the classical example is that of Irene, described by Pierre Janet:

"We must remember that this woman's death has been very moving and dramatic. The poor woman, who had reached the last stage of consumption, lived alone with her daughter in a poor garret. Death came slowly, with suffocation, blood-vomiting, and all its frightful procession of symptoms. The girl struggled hopelessly against the impossible. She watched her mother during sixty nights, working at her sewing-machine to earn a few pennies necessary to sustain their lives. 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. It was one of the most splendid cases of somnambulism I ever saw.

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

[1] W. B. Carpenter, *Principles of Mental Physiology*, pp. 325–326, 1886.

[2] C. D. Fox, *Psychopathology of Hysteria*, p. 219, 1913.

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."[1]

These must suffice for the present to illustrate the problems which confront those who are professionally interested, not only in pathological cases but in the prevention of their occurrence in the first place. We have sketched only a fragment of the whole emotional picture. There are insistent demands from other spheres of life. One of our foremost educators recently wrote, "My guess is that some of the most significant developments for the purposes of psychology and education will be in the field of research upon emotions." The problems here faced in connection with motivation in learning and the much discussed subject of interest are patent.

But these problems are everywhere. They are seen from every angle of the human mind. Long ago Sully clearly stated the situation:

"But feeling is not merely a subject of great importance in itself: it stands in certain relations to the other two sides of mind. On the one hand it is connected with intellectual growth, since it supplies the interest of study. Hence no theory of intellectual culture can be complete without some reference to the emotional susceptibilities. On the other hand, feeling stands in intimate connection with action and will. The incentives and motives to action are represented feelings (anticipations of satisfactions of various kinds). The habitual directions of conduct follow the lead of the dominant feelings. Hence the study of the feelings is of great practical moment as a preparation for the theory of moral culture, and the formation of character."[2]

6) Emotional Attitudes among the Other Aspects of Mind.—After these varied illustrations of affective behavior and experience, let us return to the central theme and ask what place psychology gives to this phase of mind in its systematic treatment of the subject. The new traveler over this area of psychology has the right to a rough road map and perhaps even to the services of a competent guide. Let us therefore glance briefly at some of the landmarks until closer inspection is possible. We shall then have a sort of speaking acquaintance with the subject until something like a real understanding can be achieved.

As we analyze the human mind we find that there are certain distinct phases in its operation. These aspects are not marked off as independent or unrelated in the sense of the outworn terms, powers, or faculties, but they are ways of regarding the total entity which we call the mental

[1] *The Major Symptoms of Hysteria*, pp. 29–31, 1907.

[2] J. Sully, *Outlines of Psychology*, p. 450, 1887.

life. In other words, as we view other people's minds and our minds, we realize that they behave in certain ways and we may momentarily, therefore, regard them from these different angles. That does not mean that they behave exclusively in any one of these ways for any length of time. But when we scrutinize ourselves and thereby reduce what is a complex phenomenon to simpler concepts and translate these concepts to linguistic terms, we can conveniently make four classifications regarding the general activities of the human mind. While James Ward, the English psychologist, reduces mind to three instead of four categories, his statement of the basic principle that there are different aspects of experience can not be improved upon:

"The most elementary facts of mind cannot be expressed in less than three propositions: I feel somehow, I know something, I do something."[1]

First of all, the human mind, as well as the animal mind, is what Herbert Spencer, and G. Trumbull Ladd called 'sentient.'[2] It is conscious, aware, cognitive of what goes on in itself and outside itself. The English psychologists have called this the noetic or presentative function of the mind, indicating that it 'knows' what is going on in the environment or that objects, events, and situations are present to consciousness. A piece of stone, a tree in the forest, a steel rail on the track, we believe, do not know anything about the outside world or about themselves. Later on we shall have something more to say about the cognitive function in a further development of the emotions. Suffice it for the present to realize this aspect of our mental activities.

Secondly, taking our stand at another point of vantage and training our sights again on the human mind, we may say that it feels, it is moved and stirred, it responds with a degree of sensitivity continually changing but referring to its own state and condition. You become aware by the patter on the tin roof that it is raining. This is cognitive. This is what you realize. But in a flash you are also disappointed because you had planned to go on an outing and now if you do go it will be less comfortable, less pleasant, and less enjoyable. In other words, you have a feeling reaction which is added to the cognitive factor. There is a question in the mind of some psychologists as to which is more fundamental and rudimentary; in other words, which came first in the development of the simplest forms of minds. Out of this feeling

[1] *Psychological Principles*, p. 34, 1919. Historically important in this connection is one of E. V. Scripture's earliest books, *Thinking, Feeling, Doing* (1895), in which many of the current experimental approaches of that day were made interestingly instructive to the general reader.

[2] *Elements of Physiological Psychology*, p. 3, 1887.

response comes an entire series of affective reactions and the whole gamut of the emotional life. This is the aspect which we shall most definitely stress although at all points it touches the other aspects as well.

Then we may note that the human mind has motor tendencies; it inclines to act, in short, it is responsive. The very term 'mental activity' connotes this. It is not a passive receptor, does not allow itself to be quietly impressed, as sealing wax receives the imprint of the signet ring. But it is a lively, dynamic entity. There have been a number of motor theories of mind, some of which have exaggerated, perhaps, like the ideomotor theory, the actual physical response. In not a few writings, especially of English origin, this aspect has been termed conative, and there are well-developed systems of psychological thought which revolve about this concept. Many responses lead not to outward manifestations but to inward elaborations and to physiological effects. Here, too, come several of the behavioristic points of view. We need not be intimately concerned with any of these but we should recognize that mind is active and that, under many circumstances, expressions and responses result.

Finally, mind is constructive. It is simply impossible for us to entertain any notions or ideas that do not make something out of what they cognize, feel, and respond to. There is a constant interplay of inference, perception, imagination, and what is in general called thought. Sometimes this has been referred to as the representative function of the mind, but this distinction, so named, does not always exactly fit our scheme. That is why it is so difficult for us to tell a story straight or to be consistent in our accounts from time to time, not so much that we forget, but that we invent and elaborate. This fact was an important discovery in connection with 'lying' among children. There is not normally at first even the intent to lie, but only the impossibility of keeping from imagining. Thus from an emotional point of view it is not so much a question of what the actual physical stimulus to emotion is but what we think it is or may be. You may have been insulted by a remark that was never intended as an insult.

There is a delightful story about two men wagering with each other on this very subject. One said to the other that he could make another person angry by calling her names which she did not in the least understand and so he approached a woman who was selling fish in the fish market. He took up a fish, smelled it and said, "You are an *article*, I mean you are an *adjective*, an *adverb*, a *verb*." She got very angry and began to blush. He then proceeded to call her in a similar way a *preposition*, a *conjunction*, and a *pronoun* until she was ready to

fly into a passion and call the police. She did not in the least understand these words but she thought she did. This so often happens in emotional situations because we elaborate and reflect on the situation in terms of our own experience with the result that some emotional responses are fed from within by our own ideas and attitudes.

The story serves also to point out the lesson of the tremendous interplay of all phases of the human mind. It is hard to distinguish one from the other but they are there, and of these four phases we shall concentrate on the feeling or emotional aspect, bringing in its relationship to the other three under various appropriate headings.

(7) **Summary.**—Thus we have scanned the landscape and have seen in a preliminary way what we shall now approach more intimately. We are here interested merely in introducing our subject and in giving a sort of survey of the situation. We shall presently proceed to a historical summary of pre-experimental literature, by way of both observation and theory, then to matters of method and technique, and later to more detailed facts under their appropriate headings. In the course of this journey we shall have to remember continually that there are plenty of side roads, which we shall indicate as we go on. Occasionally, we shall have to rise to some elevation to refresh our memories with a bird's-eye view of the whole lest we fall into the error of regarding our especially routed trip as the only possible thoroughfare through the territory of the human mind.

We have found that the human mind exhibits in a variety of circumstances a definite phase which we have called an emotional or affective response. Examples are to be found not only in such typical experiences as fear, anger, hate, love, envy, desire, and the like, but in the enthusiasms of human endeavor, in the ecstasies of religious activity, and in the ordinary desires and impulses of daily life. These phenomena must be investigated in an objective, impersonal way and with the aim constantly before us to know more intimately and searchingly their real inward nature and their relationship to other aspects of the mental life. This phase of experience was recognized early in the history of thought and was given a variety of interpretations in the light of the doctrines current at the time. We also saw that men were differently constituted in regard to their emotional characteristics, a fact that was emphasized especially in abnormal cases. Here there were extremes both in the intensity and in the quality of the experience.

Finally we scrutinized the general texture of the mind from the side of its cognitive, sentient, noetic, presentative, or 'knowing' attitudes; from the side of its subjective, moved, 'stirred-up,' affective, or feeling aspects, which form the leading theme throughout the book;

from the side of its active, impulsive, dynamic, conative tendencies; and lastly from the side of the imaginative, reflective, inventive, or elaborative manifestations. There is an enormous interplay of these varieties of experience, but the arbitrary distinctions, while not always clear in actual life, help us to understand the emotional phases which we are to discuss. Incidentally educational problems were indicated; these will also come in for more specific treatment in what is to follow.

Review Questions

1. From your own experience give five examples of an emotional sort.
2. Try to give an objective and impersonal description of one of these experiences.
3. To what extent did primitive man view the world from a personal point of view?
4. Define *anthropomorphism*, *metempsychosis*, *animism*, and *hylozoism*.
5. Mention two or three ways in which emotion may be combined with reason in working through the affairs of everyday life.
6. Describe some two or three cases of extreme emotional behavior.
7. Name and explain three categories into which all mental processes may be classified.
8. Give five examples of the constructive tendency of the human mind.
9. Name as many emotions and moods as you can.
10. Show that it is impossible any longer to regard mind as a receptacle in which knowledge may be stored.

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CHAPTER II

A HISTORICAL PERSPECTIVE

Truth is the keystone of the arch of history, based on the two supporting pillars of accuracy and veracity. Truth is composite: veracity is its ideal, accuracy its real element.

W. K. Wallace, *The Trend of History.*

1. Difficulties in the Way.—As we have noted before, there was no hesitancy or delay in the early recognition of the affective life. Feelings were given a part, often a place of honor, in the classical cosmologies, religions, and philosophies in many cultures the world over. But anything like a detailed study of this angle of human experience faced several hindrances and hazards. Careful consideration and analysis of the emotional responses had to wait the more favorable sanction and encouragement of a very late century in the history of thought. Not that there were no sporadic attempts and occasionally even serious descriptions and classifications of these mental phenomena along the way; but consecutive and protracted envisagement of this aspect of the mind was a long time in showing its head. When it did dare to stand up in its full stature, there was still some trepidation and not a little protest. This struggle on the part of the affective processes as compared with other mental activities, like reason, memory, and the will, to gain the attention of scholars and scientists is an interesting episode in the development of knowledge. We shall appreciate much more the value of what we know today if we spend some time examining the gradual growth of accurate information on the subject of the emotions. The checkered career of these processes toward a place in the sun makes one visualize the tremendous efforts of a seed pushing its root tip down through the cracks in a cliff and at the same time forcing its plumule around a stone overhead to seek renewed vigor from the light.

2. The Prominence of the Intellectual Factor.—From time to time at least four obstacles hindered and sometimes prevented the growth of a psychology of the emotions. First of all, man's newest acquisition, like a child's first toy, aroused his most fervent curiosity. The human mind is distinguished from the lower animal mind principally through the use of 'free' ideas—ideas unattached to immediate physical

stimulations and present perceptions. In other words, man has the power to elaborate upon his environment in terms of ideas, to invent mentally, and to reconstruct new relationships and new wholes out of old materials. He thinks, reasons, and reflects. This became in itself a pleasant pastime and absorbed the major energies of his being. Man became inquisitive about this power to reason and overlooked or neglected his emotional resources. We may say, therefore, that the first obstacle was that of sheer neglect in the presence of a more attractive competitor, namely, reason and the products of reason.

From the time of Plato on, the most pressing need, therefore, was an intelligent understanding of the universe. It was consequently also highly important that the witnesses who testified to the existence of the world, namely, the senses and the intellect, be themselves examined and cross-examined. Writers were, on the whole, mainly interested in establishing the adequacy or inadequacy of the channels through which information came to the human mind. In other words, they investigated the knowing or cognitive processes and tried to establish their validity and their intrinsic reliability in reporting accurately both on phenomenal experience and on matters which transcended the immediately given experience. This ultimately led to a development of the rules of logic and to the discovery and classification of the errors of deductive reasoning in which the Schoolmen of the Middle Ages were remarkably well versed. It also led to a keen interest in the senses and their respective place in the whole scheme of things. The issue which confronted these serious thinkers, therefore, not only caused them to neglect certain areas of mental activity but, more than that, placed a premium on those functions of the mind which elevated man above lower organisms and the rest of the organic and inorganic universe. Philosophy was given a clear road to development and the life of the intellect, its adequacy and inadequacy in the direction of truth, its detailed mechanism for transmuting truth into the concepts of human experience, and the refinement of laws, of logic, and association—all this was the major proposition and with it for centuries was philosophy principally concerned.

In his history of early Greek philosophy Pillsbury emphasizes this point in a number of instances:

"The feelings and emotions receive less recognition in Plato's writings than the intellectual processes."[1]

"Affective life and action receive less consideration and are on the whole subordinated to knowledge."[2]

[1] W. B. Pillsbury, *The History of Psychology*, p. 23, 1929.

[2] *Ibid.*, p. 31.

"In addition to the intellectual processes, Thomas [Aquinas] discusses the appetitive and voluntary functions, emotions and will. Both were subordinated to the intellect. Emotions were likely to disturb pure thought when given full sway but might and should be controlled."[1]

As we pass through this historical account of the affective life it will grow apparent that gradually the emotions have come into their own. As a matter of fact, already in some of the European countries and possibly even in the United States there is beginning to be a distrust of the sheerly intellectual functions and their fruit. The cold reasoners and the indomitable executives, exponents of mere reason and exponents of mere will, are rapidly falling into the discard. We are looking forward with hope, in the process of salvaging our civilization, to the leaders who combine in their personality a balanced ration of all mental functions. Their example will not only cause the corresponding chords in the average citizen to resonate, but stimulate a program of serious thinking along these lines among our constructive psychologists. History will then record a fitting climax to the gradual ascent of the emotional life in the thoughts of men. Evidence of this renaissance is apparent in numerous writings of today. The following quotation from a recent article is a good illustration:

"There is a growing interest in emotion. Our intellectual powers—our power to reason, to remember, to imagine, to see—used to receive our almost exclusive attention in the study of the mind. But now we know that the individual's happiness, the happiness of his family, his effectiveness in business, his mental and physical health may be seriously influenced by his emotions."[2]

3. The Influence of the Ethical Attitudes.—The historical situation is necessarily complex. There are other factors which operated to suppress the careful study of the affective life. Not only was the intellect the favorite child of the early philosophers and psychologists, but the milieu of the times was an unsuitable atmosphere for the growth of investigations into the emotional life. Besides, the very nature of man himself had to be changed in its essential attitudes and the intrinsic difficulties that lie deep in the constitution of the emotional responses themselves served as a barrier against analytical approaches or at least as a hurdle to be leaped in the progress of scientific analysis.

It must be remembered also that the problem of the interplay of supernatural forces with the more direct experiences of life called for

[1] *Ibid.*, p. 51.

[2] G. M. Stratton, Psychological reactions during danger, *Scient. Mo.*, 21, 1925, pp. 633–634.

a long drawn-out siege. The secret Orphic mysteries, bringing in their influences from Persian and perhaps ultimately from Egyptian and Sanskrit sources, had a persistent hold on the doctrines of many generations of Greek thinkers. They came to their fruition in the ideology of Plato. But even after the more natural philosophy of Aristotle there was much of magic and mystery recurring in the thoughts of men, especially in the long interim during which the Aristotelian writings were lost to view. The persistent force of this handicap in psychology is incomparably described by Madison Bentley:

"Since there indubitably exists something which is constantly and confidently referred to as 'mind,' it may seem strange to you that men have been slow in acquiring a straightforward and reliable account of it. The chief reason is not far to seek. The age of scientific description was preceded by unnumbered centuries of magic. Before men considered natural causes and formulated sober natural laws, they were governed by ritual and by a belief in spirits, demigods and divinities. The great men of those earlier times were the priests and the magicians. Instead of orderliness in nature men found caprice, cunning and malice. Nature was to be appeased, not understood and controlled. Gradually, in spite of magical traditions, came hints of a natural order. The storm arises—as man at last discovered—not from angry gods but from meteorological conditions, pestilence from the disregard of hygiene and not from the maledictions of an avenging spirit."[1]

While the belief in the supernatural and in 'intuitions' is saturated with emotional attitudes, it also furnished a drawback of serious consequence. The intellectual and other cognitive functions suffered somewhat also, but the emotions and their kin were hardest hit. We may call this handicap the ethical connotation. For a long time the affective responses were tied up with the vital business of good and bad conduct; the affairs of both church and state, the problem of life before birth and after death were involved. How could one be cool headed and analytic—even descriptive—about such a deep-seated question. Gardiner, who is probably responsible for the best historical work on the feelings in Greek literature, similarly states:

"Here, as throughout the ancient period, and, for that matter, throughout every period, the motive underlying the examination of the affection is practical. In post-Aristotelian philosophy the ethical interest, and along with this the religious, is everywhere paramount. The primary question relates to the worth and place of the affections in an ideal scheme of life. It is for the sake of this alone that any enquiry is undertaken as to their nature

[1] *The Field of Psychology*, pp. 6–7, 1924. The serious reader will be repaid if he follows this discussion to p. 16.

and conditions. This interest vitiates the scientific analysis and perplexes the psychological theory."[1]

Many worthy people of today will say, "I can not tell you *why* I should do it, but I *feel* that it is right." Such fervent convictions carry with them, then, the cloak of inscrutability. Only one gifted with 'divine insight' can give help here. We recall, perhaps, the quoted introduction given by a local negro preacher to a celebrated clergyman who was to supply the pulpit. It ended with the peroration:

"My friends and brethren, our leader this morning is a man who can describe the undescribable, one who can depict the undepictable, a man who can unscrew the unscrutable."

But science is not given to 'unscrewing' the inscrutable and therefore it had to wait until the emotional responses were scrutable! So long as the religious sentiments were not of the empirical order and had little in common with natural phenomena, they remained without the pale of serious investigation. Dessoir opens his history of psychology with a pertinent description of the earliest envisagement of the human mind in terms of theological and metaphysical concepts of the human soul, which corresponds roughly with what we now designate as the human mind.

"Among other peoples the experiences of those who, through dance-orgies and raptures, believe themselves to be lifted into a strange world lead similarly to the acknowledgment of a second self, which must be contained within the bodily self. Such primeval soul-cults were the sources which gave rise to the (still active) currents of myth, popular superstition, and spiritism, as well as to all metaphysical doctrines of a divine, immortal soul-substance."[2]

Allied with this difficulty, and really part and parcel of it, was the notion that if the emotional responses were not tinged with the highest elements of the 'spirit,' then they must be consigned to the lowest strata of animal life. They had to do with the impulses of the 'flesh.' Through the 'flesh' the devil manifested himself. These affective processes were then either inscrutable or 'untouchable.' Their envisagement was therefore either beyond the vision of man or beneath his dignity to consider. On this subject Dessoir again gives a clear statement of the issue when he says of psychology as a whole:

[1] H. N. Gardiner, Affective psychology in ancient writers after Aristotle, *Psychol. Rev.*, 26, 1919, p. 205.

[2] M. Dessoir, *Outlines of the History of Psychology* (trans. by Fisher), Introduction, p. xii, 1912.

"It was indeed inevitable that discord should prevail within a science whose subject-matter was from the beginning in part the god-like daimon, in part the animating soul, which had thus on the one hand a leaning toward the supersensible, on the other hand toward nature. In both directions different and yet combinable points of view were developed."[1]

As he points out, not only was human experience driven to these opposite poles of divinity and nature, but frequently a fairly complete separation was made in the personality between the functions that belonged to one sphere and those that belonged to the other. "United we stand, divided we fall" is therefore applicable not only to political states but also to a comprehensive discussion of a single phase of the mental life, like the affective process.

4. The Personal Side of the Affective Life.—We turn now to a somewhat related handicap which delayed the process of systematic treatment. Again this difficulty applies to some extent to mental processes other than the emotional life, but probably not to the same degree. We have already discoursed on the matter at length under the heading "The Scientific Attitude." But since this phase of the subject is still to some extent an obstacle in the way of scientific research, we may wisely consider it for the moment.

No question arises concerning the intensely personal and private aspect of the emotions: there always has been something sacred in the feelings and affections of the human individual which stood aghast at any attempt to make a scientific probe. Sometimes, perhaps, there was as much of the attitude of shame as of righteous indignation in connection with this covering up of the emotional life. It was next to impossible, therefore, to get any objective record of human experience in this connection. If the anecdotal method was something to be combated and circumvented in the work of animal psychology because we regarded so many animals as pets, how much harder was it to become objective about an experience that was so intensely subjective in ourselves! Happily, the accumulating investigations of the intellectual processes themselves gradually paved the way for a further investigation into the likes and dislikes of individuals and into their more complex emotional experiences. Few enlightened adults or unenlightened freshmen now rebel against any scientific investigation of their intelligence quotient. As in our experiences with army officers during the war perhaps this can be explained by the hypothesis that those with bright and aggressive minds are proud to have themselves scored while those with inferior or docile minds do not know what it is all about and therefore placidly submit! But seriously speaking, a most remark-

[1] *Ibid.*, p. 87.

able transformation in the mental attitude of the 'victim' has become manifest, especially in the span of the last half century. Mental measurements are now being made almost with as much aplomb as physical measurements are made in the gymnasium. This attitude may be carried over now into the emotional life provided no undue advantages are taken and personalities as such are objectively regarded.

The point is that many thoughtful people are now convinced that we know, on the one hand, very little scientifically about the emotions, and that, on the other hand, we should know much more. Crises like the World War, in which not only the soldiers at the front but the civil population behind the lines had to be motivated, made us keenly realize that here was an aspect of human life which had been seriously neglected. Many critics also saw that our social structure was suffering for the want of adequate knowledge about the emotions. So scientific investigations have constantly forged ahead using objective methods and trained observers in finding out more facts about this aspect of our mental life.

Naturally it took many centuries of persistent attack to bring about this newer objective attitude toward such an intimate and closely personal part of our mental life. The very fact that the emotions had been historically connected with such ethical and moral principles as those involved in soul, character, temperament, and personality made the careful scrutiny of them that much harder and sometimes impossible. We should also recognize here that as long as discussions of those phenomena were carried on in the abstract and by the deductive method no offense could be felt. Progress had to be made even here, however, because in some epochs of the history of thought it was a high crime to mention, let alone to discuss, phases of bodily activity, for human faculties, like pure reason, should be busied with divine contemplation rather than with mundane matters. Emotions had many symptoms of carnal origin and relationship upon them. But when the scientifically inductive principle was applied, actual human and animal specimens must be observed and investigated. Such tactics would of course precipitate almost as much furore as the theory of evolution stirred up, even at so late a date as a few decades ago.

Gradual development in the face of this obstacle has fortunately taken place, however, as we shall see in the section later to be devoted to the experimental approaches. Suffice it here to note that the personal factor served, perhaps more than any other, to retard the steady progress of investigation.

5. Difficulties Arising from Its Inherent Nature.—As if there were not yet enough obstacles to overcome, we find still a fourth barrier that

we must cross in order to approach a scientific study of the affective phenomena. This last barrier, moreover, is a sort of triune affair—three parts in one. The problem as a whole may be referred to as that of the inherent or internal nature of the processes called affective. It may be called the qualitative question. Every science has problems that are relatively easy to solve. These are usually taken first. In this way, with the help of the sister sciences, psychology experimentally first attacked the sensations and the simpler motor responses. After these were conquered—or at least were well under way—other problems, often arising out of the simpler ones, were attacked until we got to the most complicated and sometimes the most baffling and resistant ones. So it was here. Of all the affective responses the emotions were exceedingly significant and interesting but they were also very complicated phenomena. Together with the thought processes they compare rather well with the higher organic compounds in chemistry or with electricity in physics. We must remember that one of the highest chemical compounds, that is, living tissue or protoplasm, still is an unsolved chemical problem. Many of the electrical phenomena are equally puzzling to physicists today. These are not permanent difficulties, but they retard progress, while more elementary considerations are fairly well cleared up.

So it is with the emotions. A full-fledged emotion is difficult of analysis on account of its real or inner nature. Suppose you are intensely frightened if suddenly some one pokes a pistol into the middle section of your anatomy while you are walking along a dark deserted road or on an unfrequented street in the early hours of the morning. Such an emotion can be duplicated to all intents and purposes in the psychological laboratory. What happens? Can you make a cold and careful calculation of all the mental symptoms while this is going on, as you could make a studied and reliable report on the color of a piece of paper or the pitch of a tone? Usually you can *not*. Your business at the moment, if you do not realize that it is all a farce or a practical joke, is your safety. Attention is not on the various mental processes that are involved and the different reflex responses that are brought into play, but on how to escape from danger either imminent or imagined. Your whole self is at stake and, through long ages of development, organisms have within them deep-rooted but complicated responses that call into action practically every mechanism in the body and every kind of mental activity.

Thus it is certain that, unless there has been considerable training in mental analysis and classification of mental processes, attentive regard can not easily center on the problem of carefully scrutinizing

what is going on. There is first, then, this fact of a distracted or 'all occupied' attention. Undoubtedly the more intense affective responses are unique in that they consume the full range of attention and mental activity. It is therefore hard but not impossible to take the scientific attitude and to get cognitive results.

Secondly, it is hard to separate the predominantly mental aspects from the organic or bodily responses. The affective processes have the habit of resounding over the entire psychophysiological organism. From the angle of observing the physiological responses we find that the picture is as complicated on the side of the body as it is on the side of the mental life. It is hard to unravel the thread of motor, chemical, or electrical manifestations. The very intricacy of the emotional processes on both mental and bodily aspects and their mutual interdependence and interreaction stand in the way. This factor has also made it possible, however, to use certain techniques based on these very reactions. The dryness of the lips and mouth, the catch in breathing, the paling of the face, and certain more subtle bodily changes are utilized through sensitive apparatus and techniques to explore the affective processes.

Finally, a third characteristic of even the weakest and simplest affective responses has somewhat retarded their scientific scrutiny. The basic qualities of even the most complicated emotional responses, like pleasantness and agreeableness, and their opposites, unpleasantness and disagreeableness, are intrinsically vague and indefinite. Bentley compares them with a 'haze,' 'mist,' 'varnish,' or 'sizing':

"They are never 'blocked in'; they never are localized or 'placed' with respect to the qualities already described. They have been likened to the haze upon the mountains, the mist spread throughout the valleys and the varnish or sizing upon the painting. They 'tone' but they do not 'inhabit' experience."[1]

Titchener claims:

" . . . that affections lack, what all sensations possess, the attribute of clearness. Attention to a sensation means always that the sensation becomes clear; attention to an affection is impossible. If it is attempted, the pleasantness or unpleasantness at once eludes us and disappears, and we find ourselves attending to some obtrusive sensation or idea that we had not the slightest desire to observe."[2]

[1] *Op. cit.*, p. 90.

[2] E. B. Titchener, *Lectures on the Elementary Psychology of Feeling and Attention*, p. 69, 1908. *V.* also *A Beginner's Psychology*, p. 79, 1915. In the main he follows Külpe's interpretation in the *Outlines of Psychology* (trans. by Titchener), pp. 258 f., 1895.

In a similar manner Calkins prefers to call the affective elements "'attributive' elements of consciousness" because they "are not always present and . . . they seem to belong with other experiences of any order." They are also "more naturally, and probably primitively, referred to the self."[1] Woodworth takes a like position by referring to feeling as an 'under-current,' a 'back-ground,' as a 'diffuse' though 'massive' experience and states that "feeling belongs with the internal life of the organism."

"Feeling seems like a passive state of the organism, rather than an activity; but it must be some sort of activity, since it depends on life. It is internal rather than overt activity."[2]

Warren presents the same picture. "Our mental life at any moment is generally tinged with a pervasive feeling of some sort." One of its distinguishing features is its shiftiness:

It is localized now in one place, now in another. The most prominent feature of these experiences is the "hurt," or sense of discomfort—not the *kind* of hurt or its location. The same is true of pleasant feelings. It is difficult to locate the feeling of "thrill" or to analyze its quality."[3]

At this point we should not fail to mention that up to 1896, when his tridimensional theory appeared in the *Grundriss der Psychologie*, Wundt acknowledged the same difficulty by making the feelings not an elementary process but an attribute of consciousness.[4]

From these various angles, then, we can justify the tardy development of an analytical and objective investigation of the emotional life. All told we have seen: (1) how the intellect and intellectual products blocked the way for a time; (2) how magical, ethical, and religious attitudes and interpretations repelled scientific study; (3) how personal and private considerations warded off an attack on this last citadel of intimate experiences; and (4) how the intrinsic nature of emotion, arising (*a*) out of its complexity in the direction of an attentive seizure of the whole mental life, (*b*) out of the vagueness or indefiniteness of its qualitative aspects, evaded a more direct and positive scrutiny. With these facts in mind we may profitably pass on to a historical account of the progress that gradually took place and of the facts that were divulged.

[1] M. W. Calkins, *A First Book in Psychology*, 4th rev. ed., pp. 183 f., pp. 330 f., 1914.

[2] R. S. Woodworth, *Psychology*, rev. ed , pp. 283 ff., 1929.

[3] H. C. Warren, *Elements of Human Psychology*, pp. 204 f., 1922.

[4] *V.* E. G. Boring, *A History of Experimental Psychology*, pp. 324 f., 1929.

6. The Early Greek Period.—Before Aristotle's treatment of the emotions we find only scattered references to the affective life. The fragments and the commentaries that have come down to us are usually full of precepts and somewhat cryptic sayings that apply to right living in a world which is still much of a puzzle to the inquiring mind. Occasionally we happen upon a statement that may be significant in the light of later developments. Pythagoras (*c.* 530 B.C.), who was keenly interested in establishing numerical relationships between natural objects and experiences of all sorts, soon discovered the pleasing and displeasing effects of consonances and dissonances of simple chords. He had analyzed the clang quality of tones and had found the simple ratios between the constituent partials. When these were combined in various ways, he noticed also their emotional effect. These observations were said to have been made in a blacksmith shop when he listened to the clanging of the hammers on the anvils. It is also of interest to note that, in his system of attaching numerical significance to all types of relationships, the number eight was attributed to friendship and love since this number comprised the octave and typified its harmony. To Empedocles (*c.* 455 B.C.), for example, is attributed the saying: "Pleasure is produced by what is like, in the parts of the body and in the mixtures, pain by what is unlike."[1]

We have already noted that Empedocles utilized two primitive emotions, friendship or love (φιλία) and hate or strife (νεῖκος), as independent forces causing motion in the material elements. It was a novel attempt to explain the changing mixture of fundamental substances in nature through the feelings. The four elements were absolutely similar and at rest in peace in the divine sphere until dividing strife pressed in from the circumference, disrupted the union, and began thus to develop the world. It was also observed by Anaxagoras (*c.* 460 B.C.) that

> " . . . all sensation is accompanied by pain. This would seem to be the simple consequences of his presupposition; for the contact of unlike with unlike is in every case painful. This pain is conspicuous in the case of sensations long continued or very intense; for brilliant colors and loud noises cause pain, and one cannot stand the same sensations very long."[2]

Both Empedocles and Anaxagoras said that plants are set in motion by desire and that they perceive and feel pleasure and pain. Democritus (*c.* 420 B.C.) joined these two authorities in declaring that plants have mind and intelligence.

[1] C. M. Bakewell, *Source Book in Ancient Philosophy*, p. 48, 1907.
[2] *Ibid.*, p. 55.

All told we see that some attention was paid to the affective responses in noting their existence and in utilizing them in an envisagement of the world. In pre-Aristotelian thought, however, only two marked tendencies are apparent. There is first the perfectly naïve and unstudied attempt to weave feelings into the fabric of a cosmology. As is especially noted in the case of Empedocles, but also occasionally in the concepts of other spokesmen, motion or flux or agitation of the elemental particles was caused by emotional factors. This is the result of anthropomorphism and hylozoism. Just as persons are moved or disturbed by affective processes, so must matter be moved. Thus one of the essential characteristics of the emotional life was discovered and put to work in the scheme of things. Soon, and quite naturally as an outgrowth of this state of affairs, a second tendency became plain in the light of the whole drift of philosophy itself. Emotions and their proper use or control became a guide to life. "It is hard to contend with passion; for whatever it desires it buys at the cost of the soul," says Heraclitus (*c.* 505 B.C.). "It is more necessary to extinguish wantonness than a conflagration." Codes of conduct and of right living rested in part, sometimes in major part, on the affective life and its fruits.

Although Aristotle's natural philosophy formed to some extent at least an interlude to this development, which took form especially in the doctrines of the Sophists (fifth century B.C.) and of Socrates (469–399 B.C.) and Plato (427–347 B.C.), it came to maturity in the Neoplatonic philosophy and especially in the controversies of the church fathers.

The typical attitude of the period just reviewed, then, is cosmological, or perhaps, to use Dessoir's term, psychosophical. Psychoses were almost everywhere uncritically read into the cosmos as a simple empirical observation with experience itself the only court of appeal. In this way the emotions served their apprenticeship during the early twilight of serious thought on the subject of the nature of Nature. Opposition makes the world, harmony is the combination of opposites, like high notes and low notes in music, but if it were not for strife everything would result in universal stagnation, for "even a potion dissolves into its ingredients when it is not stirred." Thus the infancy of the feelings is portrayed: its significance is world wide and its importance is recognized in ethical conduct.

"Before we pass on to a later century we must briefly note the contributions made by the medical doctrines of the fifth century before Christ to the psychology of the emotions. Most of these were made in the writings

attributed to Hippocrates (*c.* 460–377 B. C.) of the school of Cos. As Brett points out, however, these doctrines were rather a culmination to the thoughts of other writers who were either contemporaneous with Hippocrates or his predecessors.[1] These concepts exerted a profound influence on the doctrine of temperaments for many centuries to come. Man, in so far as he was materially conceived, responded emotionally according to his humors. Health followed upon the right mixture of them; disease resulted from a change in their respective ratios.

Physical Element:	Air	Fire	Water	Earth
Characteristic.	Dry	Warm	Moist	Cold
Bodily Humor·	Yellow Bile	Blood	Black Bile	Phlegm

"The heart palpitates with fear. Excessive joy or sorrow produces a widespread sensation throughout the body. But these are merely reverberations of the humors due originally to encephalic motion in the brain. The brain is well adapted to retain the dry air which is the best medium for thought and therefore for control of action. Emotions are again linked with movement or commotion and are therefore opposite in character to thought, which is absence of commotion."

7. The Feelings in Socrates, Plato, and Aristotle.—While there was a further attempt to settle some sort of cosmogony, there was a much more concentrated endeavor toward correct thinking, and through correct thinking toward correct living, in Socrates and Plato. Of historical interest, however, are the daimon (*δαιμόνιον*), or 'genius,' or inner oracle of Socrates and the eternal three Ideas of Truth, Beauty, and Goodness of Plato and the whole doctrine of education coupled with the so-called 'Socratic method,' by means of which inherent knowledge was revealed. The inward voice of 'conscience' of Socrates was not entirely intellectual or cognitive, but partly also emotional. Indeed it had something of the character of a divine common sense. Virtue and happiness became the highest goal of man![2] Plato made two of his three essences the basis of the highest feelings. These three ideas possessed objective reality and furnished the matrix from which all other human experiences, including the emotions, were copied. Without going too deeply into the Platonic doctrine, which was the logical sequel to the Socratic, it should be noted that bodily sensations, perceptions, and feelings furnished a constant obstacle to clear thinking. Experience, in so far as it is bodily and mortal, is a deterring and obscuring influence.

Pleasure, then, becomes double-headed: it may be impure and generally combined "with more or less of pain," or it may be "the true

[1] G. S. Brett, *A History of Psychology, Ancient and Patristic*, pp. 49 ff., 1912.

[2] *V.* A. Schwegler, *A History of Philosophy* (trans. by Seelye), 3d ed., p. 70, 1864.

and enduring pleasure" of pure reason which contemplates truth and goodness and beauty. The possession of mere cognitive attitudes, devoid of all pleasure, is not the highest end of a finite being.[1] To keep the bodily impulses within bounds is the mark of temperance. The highest mental functions are not insipid and inactive but constantly suppressing sensuous desires in a struggle against pleasure, pain, and fear. Thus begins the dualistic concept of a base body with its emotional expressions of lower order and of a spirit or mind as a regulator with its own higher aspirations and sentiments. Emotions, therefore, also take on this dual character; not all emotions are to be avoided, but only those of base origin. The highest functions of the mind, indeed, must not be colorless because (1) there is enough emotional excitement in suppressing the lower sensual impulses, the outcome of which struggle is real virtue, and (2) the contemplation of the good and the beautiful itself furnishes food of an emotional type for the mind or spirit. One of the best expositions of the dualistic nature of emotion is to be found in Thilly's statement:

"The human soul, then, is, in part, pure reason (*νοῦς*), and this rational part is its characteristic phase. It enters a body, and there is added to it a mortal and irrational part, which fits it for existence in the sense-world. This is divided into the spirited part (*θυμός*),—by which Plato means the nobler impulses (anger, ambition, love of power), situated in the heart,—and desire (*ἐπιθυμητικόν*),—by which he means the lower appetites or passions, the part with which the soul loves and hungers and thirsts, placed by him in the liver."[2]

In Aristotle the psychology of the emotions comes more definitely into its own. There is a richness of psychological material, moreover, and a firmness of systematic treatment that are refreshing after these centuries of cosmological and ethical treatment. Not that Aristotle avoids the moralistic tone, but he segregates, for the most part, the careful presentation of the emotional responses from their ethical application. In brief, the feelings are coordinate with the perceptual faculties which man possesses in common with the lowest animal soul. Pleasure arises when the bodily functions, which man has in common with lower animals and plants, are facilitated; pain is the result of their maladjustment or hindrance. These simple feelings arouse desire and aversion respectively, which then result in bodily movement. Desire combined with reflection becomes rational will. The highest form of happiness comes from the activity of the best part of our nature.

[1] *V. ibid.*, p. 101.

[2] F. Thilly, *A History of Philosophy*, pp. 67–68, 1914.

So far we are confined to the barest outline of the emotional life, but, as Wallace[1] points out, Aristotle made good the defects of his predecessors in that he did not ignore "the bodily environment of souls" nor did he confine his "observations to the nature of the mental operations themselves." Even Plato in the *Republic* had distinguished "reason from appetite and both of them from the spirit of indignation, the sense of honor (*θυμός*) which abets the reason." But in the *Timaeus* these three faculties were considered as divisions of the mind in the sense of independent faculties, thought "dwelling in the head, spirit being located in the breast and heart, and appetite residing in the lower regions." Aristotle unified the mind and all its works. He made it more or less dependent on the body and thus brought the feelings into full play. It becomes the realization of the body. The relationship is mutual, however: while mind can not be conceived without body, body can not be considered without mind. This biological or physiological context enables Aristotle to treat of the feelings as natural phenomena, minus their previous cosmological connotations. Mind is the full realization of the nutritive and vegetative life—it is a growing organism; it is capable of cognitive perception through the senses—it is sensitive; it is expressive of desire and the resultant movement—it is conative; and it is endowed with the rational powers of understanding—it is intellectual.

But with all the ground well cleared and even well harrowed to provide a good growth of the emotions, we are disappointed in the yield. There is no systematic discussion. Pleasure to Plato had been a satisfactory fulfillment of a need, whereas pain was coupled with an existing need. But Aristotle makes little progress here except perhaps to instill a little life in the Platonic scheme by correlating pleasure with pursuit of the good and pain with avoidance of the bad. They furnish the bodily guides to an intellectual control of conduct. He makes two distinctive contributions, however: (1) feelings may be attached to all kinds of sensation as well as to the higher cognitive functions, and (2) emotions result when the intellect is involved, whereas passions are connected with the lower bodily processes.[2] There had already been some indication of this division in Plato's scheme. Pains and pleasures may arise from mind, from body, or from both mind and body. They may also be mixed or pure. From the body may come the mixed emotion of pain due to cold and of pleasure in growing warm. From the mind examples of mixed emotions would be fear, regret, lamenta-

[1] E. Wallace, *Aristotle's Psychology in Greek and English*, p. xxxiii, 1881.

[2] O. Klemm, *A History of Psychology* (trans. by Wilm and Pintner), pp. 348–350. 1914.

tions, love, and jealousy. Tragedy occasions a pleasing horror. The body might experience pain while the mind is pleased, as in religious suffering.[1] In other words feelings now run the whole gamut of the mental life—although there may be indifferent sensations—and a distinction appears between two sorts of feeling, the higher and the lower.

Throughout, too, as Hammond[2] clearly analyzes it, there is no place for a pure affective process like "mere enjoyment of the pleasant or mere suffering of the painful." The conative impulse is always present so that there must be (1) a cognitive element in terms of a percept or of an idea, (2) an affective component of pleasantness or unpleasantness, and (3) a conative impulse of effort or activity. Aristotle illustrates the complexity of emotions through the instances of desire (ἐπιθυμία) and anger (θυμός). Both are closely related to the cognitive functions of sensation and both are definitely related to the active principle of conation in obtaining pleasure and avoiding pain. Desire begins with the pain of want and ends in the pleasure of satisfaction; anger arises from the sense of wrong and seeks revenge; fear starts with the awareness of danger and ends with the avoidance of disaster; while courage begins in the same way but is accompanied by the confidence of successful outcome. Envy, joy, benevolence, hatred, and pity are likewise discussed in connection with the conative impulse of wishing, where the cognitive factors are more largely allied with the imagination.[3] But the main point to be recalled is that while the list of the feelings of pleasantness and unpleasantness is complete, the roll of the emotions is not called. Only a few instances are made to serve for the class.

There is no doubt that marked progress has here been recorded in Aristotle in the naturalistic setting given the emotional life. It is mounted in a biological frame with the body bearing its due burden of responsibility. While the simpler affective properties are somewhat allied to the tendencies of avoidance and pursuit, they are definitely ascribed to *all* the cognitive processes from sensation to thought, and as they grow from simple to complex we see in them more and more the active principle of conation. But even when activity is thus assigned to them in the direction of bodily movement and response, the control of conduct is not inevitably bound up with the discussion. For the first time then we have at least the beginning of an analytic treatment of the affective life. Its failure to attain the immediate

[1] *V.* Brett, *op. cit.*, p. 89.

[2] W. A. Hammond, *Aristotle's Psychology*, p. lxviii, 1902.

[3] Brett, *op. cit.*, pp. 139 f.

advance in Aristotle's writings that we might expect is to be explained in the unripeness of the age, because even this advance was doomed to a premature decadence in the centuries which followed on the heels of Aristotle's enlightening treatises. So important for future generations, however, were the doctrines of Plato and Aristotle concerning pleasure and pain that Sir William Hamilton interpreted all other theories as merely modifications of them.[1]

8. Later Greek and Early Roman Period.—After Aristotle there was almost a complete about-face from the naturalistic and scientific attitude which marks his writings. The theological and moralistic strain once more comes to the fore. Brett says that the history of psychology reached a significant climax in the work of Aristotle.[2] The Stoics and Epicureans who followed displayed a more practical and human interest. The Platonic doctrine of pain and pleasure as a "disturbance and restoration of organic equilibrium" or as "phenomena of want and replenishment" and the Aristotelian notion of pleasure as a symbol of the "completion of unimpeded activity" like the "bloom on youth" were not forgotten. But they were applied to the problems of life, and the feelings came in for their full share of discussion. States Gardiner:

> " . . . there is no subject in psychology on which more came to be written The direction taken by philosophy, which now seeks, characteristically, to find for the individual a way to happiness and security of soul in the midst of a changing and troubled world, brought with it an increased interest in his pleasures, pains, and so-called passions."[3]

Cleanthes (264–232 B.C.) wrote an entire book on pleasure and Dionysius Heracleota (third century B.C.) devoted four books in one treatise to pleasure and two in another treatise to passion. Seneca (3–65 A.D.), another Stoic, produced a long work in three books on the passion of anger. Crantor, a member of the Platonic Academy, wrote a treatise on grief.

The Stoics dealt principally with the passions as perturbations of mind which consisted in excessive or overpowering impulses contrary to nature and insubordinate to reason. Passion is akin to instinctive response, which is normal and natural, but it goes beyond this response. The passions are diseases of the mind analogous to those of the body. There were fundamentally four passions: appetite or desires (an irrational inclination toward an object), fear (an irrational recoil from an

[1] Sir W. Hamilton, *Lectures in Metaphysics*, Vol. II, pp. 444 ff., 1859.
[2] *Op. cit.*, p. 161.
[3] *Op. cit.*, p. 204.

object), pleasure or delight (an irrational expansion of the mind), and pain and grief (an irrational depression of mind). But there was no end to the classification and subdivision of these. One writer describes twenty-seven appetites, thirteen fears, five joys, and twenty-five griefs! It is significant here to note that the classical writers on the emotions up to the end of the seventeenth century took their lead from the Stoics and did better only because they had a richer language to draw upon. Seneca bemoaned the lack of Latin terms to match the Greek vocabulary but, according to Gardiner, nevertheless describes anger "with psychological insight." It should be remarked, too, that much of the discussion became linked with the 'humors' or 'vapors' of the body, which persisted until the 'animal spirits' again emerged in Descartes and Malebranche. Not all emotions were condemned for they cultivated good affections. The following list gives instances of these:

- Cheerfulness
  - good fellowship
  - wholesome pleasure in the function of higher senses
  - good temper
- Discretion
  - shame or fear of dishonor
  - purity
- Virtuous will
  - good will or benevolence
  - affability
  - cordiality
  - affectionateness

By Zeno (356–264 B.C.), the founder of the Stoic school, four kinds of passions were portrayed: grief, fear, desire, and pleasure. Many of these, like grief, were subdivided and called an irrational contraction of the mind. The subdivisions include pity, envy, emulation, jealousy, pain, perturbation, sorrow, anguish, and confusion. This list shows the beginning of a long drawn-out tendency to name different types of emotion. Futile from the experimental point of view as this kind of logical though empirical classification was, it had to be gone through as a means of roughly clearing the ground in a pioneering sort of way. The Stoics were past masters in this art of discriminating and comparing the emotions. They were also prone to classify by opposites. After naming the three good dispositions of the mind, joy, caution, and will, they apposed the undesirable dispositions of pleasure, fear, and desire. The underlying idea as regards the matter of good or bad was the availability of these emotions as guides to conduct. Emotion was a guide but it must be in the last analysis a rational guide.

Perhaps the best known of the early philosophers who utilized the emotions in their scheme of conduct were the Epicureans. This fact is a noteworthy landmark because Epicurus (341–270 B.C.) actually extolled the emotions and placed them on a pinnacle with the highest faculties of the soul. This position was diametrically opposed to the notions of Plato and Aristotle. For Epicurus the criteria of truth are the senses, the preconceptions, and the passions. Other Epicureans added the perceptive impressions of the intellect. There are two passions, pleasure and pain, which affect everything alive. The first is natural and the other foreign to our nature. The one we choose, the other we avoid.

While the Epicurean doctrine glorified the emotions and was, consequently, called hedonistic, we can not say that it expounded a purely pleasure-loving existence. In fact there was a reaction against the Cyrenaic theory of Aristippus, which represented the view that pleasure is the goal of life and all pleasure is really a state of bodily feeling.

Epicurus held that one should strive toward continuous cheerfulness (εὐθυμία), which Democritus had already so named. Desires were (*a*) necessary and natural, (*b*) natural but not necessary, (*c*) neither natural nor necessary. The first should be cultivated, the second moderated, and the last obliterated.

Philo also put this well in the formula:

"When that which is better, namely, the mind, is united to that which is worse, namely, the external sensation, it is then dissolved into the nature of the flesh, which is worse, and into outward sensations, which is the cause of the passions."

Brett says that in this sentence are concentrated "all the Platonic dislike of ignorance, the Stoic dislike of excitement . . . and the Eastern dread of unbridled passion. . . . "

An interesting anecdote is told of Galen (130–200?), an ancient Greek physician, who considered all emotionally morbid people as diseased. He is also responsible for classifying people into thirteen different temperaments, which were later modified to the well-known fourfold classification: the sanguine (blood), the bilious (yellow bile), the melancholy (black bile), and the phlegmatic (phlegm). His temperaments also depended upon the abundance of red or blue blood. The emotions were therefore analyzed according to the preponderant materials of the body. It is said that he held the pulse of a nervous lady and read off names to her. When he came to the name of a certain actor, he diagnosed her difficulty immediately through an increase in the rate of the pulse.

Aristippus and the Cyrenaics had recognized in the feeling life three possibilities: gentle motion, violent motion, absence of motion. This is a very convenient way of stating the three outstanding philosophies of the time. The Epicureans strove for 'gentle motion'; the Cyrenaics sought for 'violent motion'; while the Stoics desired 'absence of motion.' As Windelband puts it:

"Epicurus who . . . likewise designated pleasure as the highest good, nevertheless, preferred the permanent frame of satisfaction and rest to the enjoyment of the moment. A rationalized state of enjoyment is to be preferred over mere pleasure."[1]

Or as Windelband again puts it: " . . . peace of soul is all that he wishes and he anxiously avoids the storms which threaten it, *i.e.*, the passions."[2]

"On the same ground, Epicurus prized mental joys higher than physical enjoyments which are connected with passionate agitation. But he seeks the joys of the mind, not in pure knowledge, but in the aesthetic refinement of life, in that intercourse with friends which is pervaded by wit and sentiment and touched with delicacy, in the comfortable arrangement of daily living. Thus the wise man, in quiet, creates for himself the blessedness of self-enjoyment, independence of the moment, of its demands and its results. He knows what he can secure for himself, and of this he denies himself nothing; but he is not so foolish as to be angry at fate or to lament that he can not possess everything. This is his 'ataraxy,' or impassiveness: an enjoyment like that of the Hedonists, but more refined, more intellectual, and—more *blasé*."[3]

The picture is very neatly drawn in a different light by Cushman:

"Aristippus, a voluptuary in a luxurious city, presented a pleasure theory for the few who have fortunes. It is hardly more than a grading of pleasures and the setting up of a criterion of their selection. Epicurus goes deeper than that. His pleasure theory is for the few, not because they are fortunate, but because they are wise; not because they have fortunes to gratify their passions, but because they are independent of all fortune. The Cyrenaic was a man of the world; the Epicurean was in the world, but not of it."[4]

We have gone into detail here to indicate that the emotions played a major part both in the life of the ancient world and in their deliberations concerning the universe.

[1] *Op. cit.*, p. 165.
[2] *Ibid.*, p. 116.
[3] *Ibid.*, p. 166.
[4] H. E. Cushman, *A Beginner's History of Philosophy*, Vol. I, p. 229, 1910.

9. The Christian Era.—When the Christian era dawned, the doctrines of Plato were revived but the focus of attention went elsewhere. Not this life but the life in another world was emphasized and the analysis of consciousness as such was relegated to the background. The emotions which had emerged from the body and had reached the pinnacle of their reputation among the Epicureans were pushed back and suppressed. Not one of the writings of eminent thinkers of this period, such as Plotinus (205–270) or Gregory of Nyssa (331–394) made any attempt to scrutinize the affective life. They were mainly interested in the description and imitation of God and the prescriptions to conduct were, as we well know, in terms of the finer sentiments. But no inquiry was made concerning the nature of these affective states. Their attitude towards the higher soul or 'ego' is well described by Dessoir in the statement:

"Indeed a certain animal constituent attaches to the ego, in consequence of its connection with the body, but what occurs in it—perception and desire, pleasure and suffering—leaves our true self untouched."[1]

In other words, the soul could look both upward and downward, but it should be disciplined to look only upward toward God.

In St. Augustine (354–430), however, an attempt was made to relate the Biblical doctrines to the Aristotelian point of view. It is quite remarkable how so eminent a churchman could follow the teachings of religion and still make much of his own introspections. In this capacity he was a very critical and skillful observer. While St. Augustine made no keen analysis of his emotional life from the point of introspection, he did turn his gaze in that direction, and thus began a period of careful self-analysis. In other words, it was not below the dignity of one of the saints of the church to scrutinize those phases of the mental life that lay below the level of the higher intellectual functions. Owing very likely to the influence of theology and philosophy combined, interpretation very often placed these impulses on the mechanical or merely animal level.

10. The Modern Period.—By the time that we reach Descartes (1596–1650) we have a whole treatise on *The Passions of the Soul.*[2] In this work Descartes reduced the emotional life to six primary passions: wonder, love, hate, desire, joy, and sadness. All the rest of the emotions "are made up of some of these six or at least are species of them." While this analysis still gave the emotions rank among the

[1] *Op. cit.*, p. 40.

[2] R. Descartes, *Les passions de l'âme*, 1650.

intellectual functions, they were explained in terms of motions in the brain, the blood, the 'spirits,' and the vital organs. This may be understood from the fact that Descartes distinguished between the cause and the effect, between what he called the 'agent' and the 'patient,' which he said may often be very different; while "action and passion are always one and the same thing," the two names being different "because of the two different subjects to which it can be referred," *i.e.*, to the body or to the mind. Very significant too is the way in which he passed judgment on previous attempts to treat of the emotions:

"There is nothing in which the defective nature of the sciences which we have received from the ancients appears more clearly than in what they have written on the passions; for, although this is a matter which has at all times been the object of much investigation and much thought, it would not appear to be one of the most difficult, inasmuch as since every one has experience of the passions within himself, there is no necessity to borrow one's observations from elsewhere in order to discover their nature; yet that which the ancients have taught regarding them is both so slight, and for the most part so far from credible, that I am unable to entertain any hope of approximating to the truth excepting by shunning the paths which they have followed. This is why I shall be here obliged to write just as though I were treating of a matter which no one had ever touched on before me; . . . "[1]

While this treatise on the passions also contains the greater portion of the Cartesian psychology, it is noteworthy in that it is the first consistent attempt to describe the emotional life of man. It is also significant to remark here that pain is called a sensation and not an emotion.

"For the mind is immediately warned of the things which harm the body only through the sensation of pain, which produces in it first the passion of sadness; next, hatred of that which causes this pain; and thirdly, the desire to be delivered from it, likewise the mind is made aware immediately of things useful to the body only by some sort of pleasure, which excites in it joy, then gives birth to love of that which is believed to be the cause of it, and finally, the desire to acquire that which can make the joy continue, or else that the like may be enjoyed again."

It remains to be said that Descartes had considerable difficulty in distinguishing the mental effect from the bodily agitation. In the pineal gland, which in no sense was the 'seat' of the soul, interaction between the soul and the body took place.

[1] *Ibid.*, from *The Philosophical Works of Descartes* (trans. by Haldane and Ross), p. 331, 1911.

Another important thinker of the day, Thomas Hobbes (1588–1679) explained emotions in terms of motions within the body. In his effort to do away entirely with the Cartesian innate ideas, he constructed an out-and-out materialism and has often for that reason been called the father of empirical psychology. Through his study of mathematics and his enthusiastic reaction to the work of Galileo he was convinced of the omnipresence of motion. Movements result from all sensations and ideas produced within the body. When they are great enough they result in actual movement of the members and the external muscles in general. Slight motions result in tendencies to act, or endeavors. Emotions are the results of the same principle, and in many cases Hobbes did not distinguish between emotion and action. Slight movements were called appetites or desires. They might be both positive and negative. The emotional life as a whole is compounded out of these fundamental desires and appetites. They differ mainly in intensity, in the time of the occurrence, and in the nature of the object towards which they are directed. He also stressed the direction of motion either towards an object which we like or away from a thing which is unpleasant.

"This motion, in which consisteth *pleasure* or *pain*, is also a solicitation or provocation either to draw *near* to the thing that pleaseth, or to *retire* from the thing that displeaseth; and this solicitation is the *endeavor* or internal beginning of *animal* motion, which when the object *delighteth*, is called *appetite;* when it *displeaseth*, it is called *aversion*, in respect of the displeasure *expected*, *fear*. So that, *pleasure*, *love*, and *appetite*, which is also called desire, are *divers names* for divers considerations of the *same thing*."[1]

He distinguished within the emotional life three innate states of attraction: pleasure, love, and desire; and three of repulsion: pain, aversion, and fear. This started a rather important movement in English psychology. While still very much given over to philosophical discussion and logical analysis, his treatment definitely stressed human experience as an object to be faced and investigated and did the best it could with the methods and tools at hand. Later, another Englishman, Charles Darwin, revived an empirical interest in the emotions by connecting them with his theory of evolution and by relating them to their occurrence among the lower animals. Locke (1632–1704) carried on the empirical approach to psychology and, although he stressed the problem of the association of ideas rather than the life of the emotions, he also wrote constructively concerning the affective life. The feelings became for him simple ideas. He says, for example, "There be other simple

[1] T. Hobbes, *Human Nature of the Fundamental Elements of Policy*, p. 31, 1840.

ideas which convey themselves into the mind by all the ways of sensation and reflection; *viz.*, *pleasure* or *delight*, and its opposite, *pain* or *uneasiness*." After stating that either one of these may "join themselves to almost all our ideas both of sensation and reflection and there is scarce any affection of our senses from without, any retired thought of our mind within, which is not able to produce in us pleasure or pain," he states that by pleasure and pain he would signify "whatsoever delights or molests us; whether it arises from the thoughts of our minds, or anything operating on our bodies." Satisfaction, delight, pleasure, happiness, and the like, on the one hand, and uneasiness, trouble, pain, torment, anguish, and misery, on the other, are "still but different degrees of the same thing." We find the language here somewhat archaic and the concepts crude from the point of view of analysis. Locke was, after all, a simple, matter-of-fact person. Why these feelings should be attached to various experiences is answered only in pious terms and not inquired into further. They are referred to "the wisdom and goodness of the Sovereign Disposer of all things." Locke was more interested really in the foundations of our knowledge than in the analysis of our emotional life.

In Spinoza (1632–1677) we find again an attempt to make a thoroughgoing classification of the emotions, but they are due to confused ideas that are directed toward the finite. The all-pervading principle of this classification is self-preservation. As in the case of Hobbes, the emotional life plays a part toward striving for power and honor and, therefore, for self-independence, except that Spinoza sought for this independence on an intellectual plane as a divorcement from error which could be frustrated by passion much in the manner of the Stoics, whereas Hobbes had the individual's welfare in a material world in mind, somewhat after the fashion of the Epicureans. The passions are to be controlled and, if necessary, to be overcome with reason.

But when all is said and done we must take Spinoza seriously. He is the first man who honestly faced the emotional life even if he did it still under a philosophical or intellectual bias. The introspective or experimental approach was not yet available, but he applied himself with vigor and competency to the job of making in his *Ethics* a thoroughgoing classification and analysis of the affects or noncognitive mental functions.[1] He also remonstrated with his colleagues and predecessors who treated the emotions rather as "phenomena outside nature than as facts which follow the common laws of nature" and

[1] M. W. Calkins, *The Persistent Problems of Philosophy*, 4th rev. ed., pp. 473–483, 1921.

who "would rather abuse or deride human emotions than understand them." Naturally, he was intent on an understanding among the foundation stones of a moral life. While he made his definition of emotion broad enough to include the mental processes as well as the accompanying bodily changes, he laid particular emphasis on the bodily effect.

"By affect I mean the modifications (affections) of the body by which the power to act of the same body is increased or diminished, aided or constrained and also the ideas of these bodily modifications."

This all-inclusive statement is neither a paradox nor an ambiguity when we consider that the whole Spinozistic system involved a theory of multiple aspects of the universe of which two are available to the human finite mind: that of mind and that of body—the psychical and the physical. He therefore meant that the emotion is not necessarily, as Calkins well puts it, 'the idea-plus-bodily-change' but the experience itself as felt. There is a distinction between emotions and other mental processes and also between different types of emotion. Emotion must be distinguished from cognition in that the former does not primarily, as does the latter, concern itself with external objects. Within the field of emotion he differentiated desire (*cupiditas*) or will (*voluntas*) on the one hand, and the experienced emotion in the narrower sense on the other. The mind-body relation was everywhere recognized but also everywhere distinguished. Happiness is generally attended by good health and sorrow by bodily depression but both are actually and sufficiently independent. Sometimes he appears to be inconsistent, as when he treats desire coordinately with the basal emotions of joy (*laetitia*) and sadness (*tristitia*). But generally he persists in saying that endeavor (*conatus*) is the mind's will to persist in its own right. This was distinguished from appetite for a similar endeavor of both mind and body to persist in conjunction. There are emotions, however, which do not strive toward self-persistence, such as fear, indignation, and pity. We have also evidence for the function of emotion in the direction of increasing or helping bodily activity and decreasing or hindering it.

There are numerous further refinements regarding the type of object towards which the emotion is directed, *i.e.*, whether personal or impersonal. Spinoza also hinted at an evolutionary development of emotion from less to more perfect and finally made a distinction between those emotions which are merely affective, like sorrow, or are 'passionate' in the older sense, and those which are accompanied, like desire and joy, by ideas that are active and require consummation.

"Thus, if we can be the adequate cause of these modifications, then by the emotion, I understand an *action* (actio), if otherwise, a *passion* (passio)."[1]

Most writers agree that Spinoza was not only a keen observer of the human emotional life, but also a skillful and thorough organizer of this field. Says Calkins,

"No summary, however, and no condensation can reproduce the lifelike accuracy and poignancy of Spinoza's descriptions of the emotions. . . . This doctrine of the emotions reveals the subtle analyst and the keen student of the human mind."[2]

From Spinoza on there was a general tendency to straighten out some of the difficulties which had so far been presented. Hume (1711–1766) considered feelings as impressions of self-perception by means of ideas and instituted a connection between these two through association. He recognized two groups of sensation: the usual sensory group on the one hand, and what he called 'impressions of reflection,' namely, the affective experiences of pleasure and uneasiness, on the other. Through this emotional consciousness of the self he found himself in the embarrassing position of implying a self-consciousness, although in another connection he denied both the consciousness and the existence of the self.[3] The problem still existed how and in what way the affective experiences could emerge out of a special kind of cognition. In other words the cognitive element of the emotional life still persisted. Leibniz (1646–1716) had brought the feelings into connection with confused or unclear ideas, which explanation was further elaborated by Hegel (1770–1831) in the early part of the nineteenth century. He associated this principle with the well-known theory that the feeling was an intuitive knowledge of the state of the body by suggesting that pleasure or pain arose according to the perfection or imperfection of this knowledge. According to Dessoir,[4] it was Tetens (1736–1805) who first introduced the familiar tripartite division of the human mind: "thinking, feeling, willing," which later became the cognitive, affective, and conative aspects respectively.[5] He was a member of the Leibniz-Wolffian school and a man who directly influenced Kant. But Dessoir enters the reservation that 'feeling' was still receptive and passive, while presentation and thought were active, all three combining to make the receptive spontaneity of the

[1] B. Spinoza, *Ethics* (Everyman ed.), Part III, p. 85, 1910.
[2] *The Persistent Problems of Philosophy*, pp. 475, 478.
[3] *Ibid.*, p. 184.
[4] *Op. cit.*, pp. 122–123.
[5] J. N. Tetens, *Philosophische Versuch über die menschliche Natur*, 1777.

mind. Kant (1724–1804) recognized the feelings as a special class of psychical processes and this was hardly ever denied after him. He also furnished a fairly elaborate discussion of many different types of emotions, or *Affecte*. Kant had, furthermore, already followed a suggestion from the writings of Thomas Brown, a member of the Scottish school of associationism, in dividing the emotions into sthenic and asthenic groups. He says:

"Emotions in general are abnormal events (symptoms) and may (after an analogy to Brown's system) be divided into sthenic on the basis of strength, and asthenic on the basis of weakness. The former are characterized by excitement, but also often on that account by exhaustion; the latter by depression of vital energy, but often on that account by preparation for recuperation."[1]

Wundt did not admit that an emotion could be continuously of the sthenic type while the asthenic emotions, like fright, fear, and grief, for the most part maintain, he said, their depressing character throughout their temporal course.[2]

Soon the organic sensations or feelings began to be recognized as full-fledged substitutes for the older term of 'idea' and the ideational theory of the emotional life passed gradually over into a sensational theory. Herbart (1776–1841) then came forward with a psychomechanical theory in the form of his dynamic system of the mind. Mind strives to prolong a pleasant experience and to shorten or exterminate an unpleasant one. Feelings of the same intensity can not exist in consciousness at the same time unless they are of the same kind, when they tend to strengthen each other. The pleasure derived from the sight of a flower is strengthened by the pleasure arising from its scent. If feelings are opposite in quality they tend to weaken or cancel each other. Feelings in Herbart were divided into those which refer to the object cognized, namely, the aesthetic and sense-feelings, and secondly, those that refer to the affective-cognitive aspect of the mental life, to which group belong the emotions proper. From Herbart also came the notion that sense-feelings are the 'tone' of sensory experiences, a notion which later led Wundt in the first four editions of his monumental work, *Die Grundzüge der physiologischen Psychologie*, to hypothecate a feeling tone as an attribute of a sensation depending on: (1) its intensity, (2) its quality, and (3) the total organization of consciousness. Wundt later, as a result of critical suggestions from his colleagues, organized the simple feelings as separate entities, closely associated,

[1] *Anthropologie*, Reimer ed., Collected Works, Vol. VII, p. 255, 1907.
[2] *Grundzüge der physiologischen Psychologie*, 6th ed., Vol. III, p. 189, 1911.

however, with the sensory processes and with the general texture of consciousness but abstractly derived and changing independently of sensory experience.

"Thus, for example," he says, "the feeling of tonal harmony is just as simple as a feeling connected with a single tone. The only essential difference between the two is that the feelings, which correspond to simple sensations, can be easily isolated from the interconnections of which they form a part in our experience by the same method of abstraction as that which we employed in discovering the simple sensations. Those feelings, on the other hand, which are connected with some composite ideational compound, can never be separated from the feelings which enter into the compound as subjective complements of the sensation factors."[1]

Those that are connected with sensory experiences he called sense-feelings. Pleasant sense-feelings are usually connected with sensations of medium intensity and pass through a neutral indifference zone to the unpleasant series, which are the only ones that can be produced with certainty by increasing the intensity of the stimulus. The composite feelings or combinations of feeling are "intensive states of unitary character in which single simple affective components are to be recognized. We may distinguish in every such feeling *component feelings* and a *resultant feeling*." The latter is also called a 'total feeling' and when connected with outer and inner tactual sensations is designated, a 'common feeling,' "since it is regarded as the feeling in which our total state of sensible comfort or discomfort expresses itself." It may be analyzed into the partial feelings of the first order, which are simple sense-feelings, or partial feelings of the second or higher orders, which are themselves complicated combinations of component elements. When the composite feelings are permanent combinations they are called moods.[2] Emotions refer to a complex but unified process which is fairly compact and intense. "Where, on the other hand, a series of feelings succeeding one another in time unite into an interconnected process, which is distinguished from preceding and following processes as an individual whole, and which has in general a more intense effect on the subject than a single feeling, we call such a succession of feelings an *emotion*." The more detailed treatment of these, especially their classification and their expressive accompaniments, must be left for a later section.

After this long historical journey we are now on the boundary of a vast territory which suddenly unfolds itself to our view. There are many con-

[1] W. Wundt, *Outlines of Psychology* (trans. by Judd), 3d rev. English ed., from 7th rev. German ed., pp. 83–84, 1907.

[2] *Ibid.*, pp. 176 ff.

tributing factors which can be pictured as independent streams pouring their divergent currents into this fertile plain. The old philosophy, which, culminating in Herbart, tied up the affective life principally with ideas and intellectual processes, now contributes the types of emotion which, according to Wundt, were grouped together as the reactions of apperception to the separate contents of consciousness. Since consciousness in Wundt is actively and dynamically conceived, the way it responds to incoming experiences is one source of feeling tone.

From another ravine comes the distinction which Hume first made between the feelings or emotions proper and the sensations of pleasure and uneasiness. With the increasing recognition given to the group sensations arising from within the body and those, like the tactual group, which also refer to the body, the sensory character of feeling became also more definitely recognized, as the stream of thought and information widened and flooded over the field of emotions. With it came the discussion of indifferent sensations emphatically upheld by James Mill and to some extent by Wundt and just as emphatically denied by John Stuart Mill, Bain, and Horwicz, who claim that all sensations are accompanied by differing degrees of pleasantness and unpleasantness. To this Brentano added the thought that unpleasantness does not arise with great intensities of sensation but with the accompanying sensation of pain which is thereby aroused. With the gradual independent status given the sensation of pain from numerous experimental sources, the old pleasure-pain theory was amended by substituting displeasure or unpleasantness for the sensory component of pain.

Another sizable stream from the regions of biological study and natural history brings down its deposit to the field of the emotions. Through Charles Darwin (1809–1882) and Herbert Spencer (1820–1903) the genetic approach, afforded by doctrines of evolution, further amplified and revised our whole conception of the emotional life. The facts culled from observations on animals immediately below the human level, together with those genetically derived from the study of children, gave the investigation of the emotions new blood.

Close to this stream but from an independent source came the rushing current from phrenological sources aiming to differentiate man from man, character from character, and one personality from another. The study of the head and face in all of its expressive patterns led to an intensive pursuit of what was then known as "the geometry of the face." Springs which supplied this stream came all the way from an incipient brain physiology to a searching scrutiny into the facial musculature. Postures and gestures were later added as a matter of course. This brings us now to a more modern interpretation of the emotional aspect, which in turn must be considered from every possible angle. There is on the one side the searching work that has been done on the bodily expressions, both explicitly visible and implicitly determinable, *i.e.*, both the experiments on facial expression, posture, and gesture, and the more refined work done on the endocrine glands, breathing, circulation, galvanic reflex, and other physiological functions. This approach to

the emotions had already been started on its way by Lotze (1817–1881), who was one of the earliest searchers in the field of the psychology of emotion to give a detailed statement of the nature of the expressive physiological functions and had, therefore, an influence in the direction of the later doctrines concerning the relation of the emotions to bodily changes. Then there is a section of the field, perhaps somewhat obscured in its topography, but clearly discernible from another angle, the behavioristic approach on children and lower animals as subjects. This is a very fertile section of the field and with increasing interest in the psychology of infancy and childhood much interesting material is being accumulated. From another aspect we may see the harvest that is being gathered in the field of pathological psychology, the disturbances which occur not only in our clinical institutions, but in the world at large from individual 'case' treatments. Here specialists are at work in a laboratory provided by nature itself, which, through exaggerations of symptoms, points to the normal emotional life.

In still another corner of the field we see emotions produced artificially in the laboratory but none the less real and vivid in nature. Here introspective evidence is recorded and checked against bodily reaction, stimulating conditions, and general controlled instructions. These workers strive to form a new classification of emotion, not in terms of logic but in terms of mental life. Trained and untrained observers furnish the material and already a sufficiently sizable crop is in evidence.

Further contribution comes from the side of artistic appreciation in music, the graphic arts, literature, drama, and the motion pictures. These situations are also being brought into the laboratory for intensive study and reveal a surprising wealth of material which helps us better to understand the emotional life. In this particular field of research there is no end of possibility since man as an appreciative being receives his inspirations from a wide variety of sources, each one of which may be analyzed under experimental conditions.

11. **Summary.**—While there are many individual authorities yet to be scanned, both from the point of view of theoretical and analytical psychology and from the point of view of experimental research, this is an opportune moment to take breath, as we have done, and view again the field which lies before us. But in order to make a proper evaluation of what is to come, we also ought to look back and see what has been accomplished. Let us then summarize briefly what has gone before.

1. There has been a gradual change in attitude with respect to the emotions. From the frame of mind which was largely interested first in cosmological relations and then in the intellectual processes we see a considerable change toward an increasing interest in the emotional life *per se* emerging. This change of heart is perhaps best emphasized by Spinoza, one of the greatest philosophers of all time, who made an effort to understand

that phase of human nature which we now call emotional. Others after him were to label their books, "treatise on human nature," but even they left out this substantial section of the mental life.

2. In line with this, emotions were given an independent status as mental processes. To such recognition, perhaps no one contributed more than another philosopher, Immanuel Kant. No one after him dared to put the emotions back on the intellectual plane among the ideas where they had frequently been before he had clearly shown that they belonged to a different phase of consciousness.

3. Theoretical considerations were also beginning to emerge concerning the function of emotions in regard to bodily welfare. The doctrine that pleasantness is not only a sign of a favorable environment for the mind and body but also a symbol that everything is well within, with the opposite holding true for unpleasantness, was beginning to see the light of day. This brings up, of course, the whole mind-body problem and we shall have much to learn concerning it in the field of emotion. But the significant thing here to note is that emotions became tied up with bodily functions and somehow began to reflect bodily conditions.

4. Illuminating, too, is the progress that has been made in connecting emotions with the sensory as well as the ideational life, requiring presently a reference to a particular type of sensation which began to be called the 'common sensations'; these sensations are now known as the organic, coenaesthetic, or systemic, namely, those which come from within the bodily wall, in addition to the kinaesthetic group.

These four major points loom up on the horizon as we look back over our journey and we should keep them in mind as we continue our progress.

Review Questions

1. Discuss three external factors which delayed a scientific approach to the emotions

2. Illustrate from your own experience three inherent difficulties in the emotional life which retard analytical observation.

3. How did the Greeks infuse emotional attitudes into their description of natural phenomena?

4. Trace the feelings through Socrates, Plato, and Aristotle.

5. What had Aristotle to say concerning the complexity of emotion?

6. What early instances of attempts at classification of the emotions occurred?

7. Contrast the treatment of the emotions by Descartes and by Hobbes.

8. Give two reasons why Spinoza is important in the historical treatment of emotion.

9. What two interpretations, that were influential in molding later views, can be traced to Herbart?

10. On what essential basis did Wundt define *emotion?*

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CHAPTER III

THE RANGE OF THE AFFECTIVE LIFE

Nature itself cannot err; and as men abound in copiousness of language, so they become more wise, or more mad than ordinary. Nor is it possible without letters for any man to become either excellently wise, or, unless his memory be hurt by disease or ill constitution of organs, excellently foolish. For words are wise men's counters, they do but reckon by them; but they are the money of fools, that value them by the authority of an Aristotle, a Cicero, or a Thomas, or any other doctor whatsoever, if but a man.

T. Hobbes, *Leviathan*.

1. **Terminology.**—Thus far we have used a number of terms rather indiscriminately in describing the affective phase of the mental life. The title of the book, the *Psychology of Feeling and Emotion*, we shall presently discover, is itself somewhat of a misnomer. It can be justified perhaps on an historical basis, since in our perusal of the previous chapters we have seen a changing series of terms used. The principal words used to designate this mental aspect have been in a fluid state. So the title is still quite representative of the present state of affairs when we speak of the feelings and the emotions as the central theme. The feelings and the emotions lie close to the entire problem and are, as it were, the kernel or meat of the nut which we wish to crack.

Like the symbols of everyday speech which are forever undergoing changes both in the vernacular and in the more scholarly literature, so the terminology of science itself ever seeks improvement and refinement. Nor is there complete isolation between the ordinary concepts and the analogies which underlie scientific terms. All the sciences have passed through similar stages of development, when current concepts were utilized to describe natural phenomena. Sometimes science leads the way and provides new concepts which then speedily become part and parcel of popular parlance. The present theoretical considerations of 'relativity' are beginning even now to affect ordinary conversation just as the emergence of the Freudian 'complex' was soon followed by frequent allusions in common speech and by glib repartee several decades ago. Sometimes, however, science is held back by traditional concepts buried in the language which it must use for want of any other. Such are the famous 'idols of the market-place' which Francis Bacon thought were the most difficult

of all the obstacles to scientific progress. Words and names get to have wrong or confused associations which exist traditionally in the language. Often a coined word or phrase is used with almost magical effect, like the words 'psychology' or 'suggestion,' when its real meaning is little understood. We shall soon find this out particularly when we deal with the term 'feeling.'

The physical sciences as well as the mental sciences have been handicapped in the same way. Many of them have passed through romantic episodes, such as alchemy and astrology. Then again they have outgrown conceptions that typify development within the sciences. These are the necessary adolescent phenomena common to all disciplines. We need but mention *caloric*, which was for a long time held to be the heat-giving principle of all substances, and *phlogiston* which for a full century was in a similar manner maintained as the cause of burning, until Lavoisier in the latter part of the eighteenth century overthrew this explanation in favor of something like the present theory of oxidation. Leibniz's monads became molecules, then atoms (literal meaning: something indivisible) came upon the scene, and now we have protons, photons, and various types of electrons. And so the march goes on. Now there is a tendency to explain almost all kinds of phenomena in terms of electrical energy. Energetics and dynamics have replaced statics. Vibratory motion and electrical units have replaced the movement of fiends as ultimate explanatory principles.

So it has been in psychology. The fundamental categories, as we have seen, have constantly undergone changes. Mind itself was first considered as a passive material substance that was highly attenuated, however, and almost ethereal. Aristotle's notion, for example, involved an exceedingly thin vaporous 'breath of life' or 'pneuma,' which together with the vital warmth became mingled with the blood.[1] Through the Hebrew and Christian tradition the act of God in giving life to man involved also this 'breathing into' the physical substance.[2] But soon an entire school of 'pneumatics' followed this principle to distraction. The two Alexandrian physicians, Erasistratus and Herophilus (*c.* 300 B.C.), through post-mortem examinations had already discovered the nerves and had distinguished the sensory from the motor paths. Praxagoras in the meantime had recognized the difference between the veins and the arteries and had assigned the pneuma to the latter. This conflicted with the doctrine of the Alexandrian doctors, who needed the pneuma for their 'nerve' theory.[3] Allied to such conceptions of the mind were the fluid theories of the temperaments, which passed through many hands and changed the notion of mind.

For a detailed picture of this interesting process a careful study of the history of psychology would be requisite. Glimpses of that process reveal

[1] Windelband, *op. cit.*, p. 150, note 1.
[2] Brett, *op. cit.*, p. 263.
[3] *Ibid.*, pp. 283 ff.

the principle of movement, in terms of which Hobbes explained mental functions as materialistic phenomena in the seventeenth century; the 'gentle force' with which Hume tied together the entire mental life through the association of ideas in the eighteenth century; the mental 'faculties' used for many centuries as a fundamental point of view until the climax and culmination of this doctrine in the phrenology of the early nineteenth century; and the association of ideas, which were conceived as tiles in a continually changing mosaic pattern and cemented together through basic bonds which were the chief topic of intellectual debate. The ideas were relatively stable elements that were constantly rearranged in different combinations, as one would build a variety of houses out of the same box of toy blocks. The ever changing flux and flow of the mind was represented by an ever changing design of these blocks in the mosaic of mind. This concept, too, passed through numerous changes until today we have quite another notion of the term, 'idea.'

The same transformation of terms and the concepts that lie behind the terms has occurred in the field of the affective life. Many of the historical conditions which we have noted in connection with the natural sciences and with psychology itself can be applied *pari passu* to the feelings and the emotions. In the previous chapter we have used pleasure and pain, emotion, passion, affect, appetite, impulse, desire, and the like without much discriminating comment. Even the term 'passion' has undergone sweeping changes, but the extreme meanings are still with us today. They are preserved in such expressions as 'the passion play,' 'passion week,' where the reference is obviously to the sufferings of Christ. The word 'passive' has the same root meaning, as contrasted with the more active and violent outburst or with the intense feeling indicated by our present use of the term 'passion.'

It is now our task to restrict our language according to the scientific standards of psychology and to describe the separate phases of the entire life of feeling designated by the corresponding terms. But before we do so we shall have to remove an obstacle within the confines of psychology itself. The word 'feeling' has had altogether too varied a meaning both within and without the science. Pillsbury makes this point clear.

"The principal difficulty in the discussion of feeling lies in the fact that the term has no exact and definite meaning, or perhaps more truly has a number of meanings, no two of which are altogether reconcilable, and which are held by different men of nearly equal authority. . . . The term romantic 'feeling' is used popularly and at different times has been used technically

for a number of different processes which have nothing in common except their vagueness, either in the state itself, in its reference, or in its conditions."[1]

In order to attain complete and definite understanding, let us therefore get rid of a number of historic and unscientific usages which have hampered the progress of discussion. While there is also still some uncertainty of usage within psychology, for purposes of clarity in this book let us adopt a fairly uniform currency of terms with an effort to stabilize the medium of the exchange of meanings. Perhaps, for the sake of a certain elasticity of style, synonyms are required, but we shall try to keep at least the technical requirements of standardization in mind.

The term 'feeling' has been recognized with as many as four meanings attached to it. First of all it had the broadest possible significance. Any kind of experience was a feeling. It became as extensive as the term 'awareness,' or consciousness itself. This usage may still be found as late as in the works of Herbert Spencer in the middle of the last century and in the writings of William James at the end of the last century. Let us call this the first possible interpretation or definition of feeling, namely, any phase of experience that was felt or became conscious. Feeling in this sense would correspond to some such expression as this: "I feel quite wide awake"; "I feel fully alive to the situation."

There is a second historical usage that is practically identical with what has now settled down as tactual sensation, the old sensation of touch. Sometimes the organic sensations are also included. "This piece of furniture feels smooth"; "I felt my way around in the dark." These are typical expressions of cutaneous sensitivity. The 'feelers' of animals have approximately the same connotation. Except in conversation, this usage has again passed out of scientific currency and has become merely traditional. It is, therefore, still sanctioned in our dictionaries for general parlance and also in general literature. Hamlin Garland aptly expresses this meaning in the phrase: "She, too, loved the *feel* of the water." Dorothy Aldis, one of our contemporary poets, writes:

There are things
Feet know
That hands never will:
The exciting
Pounding feel
Of running down a hill;
The soft cool
Prickliness
When feet are bare
Walking in
The summer grass
To most anywhere;

[1] W. B. Pillsbury, *The Fundamentals of Psychology*, rev. ed., p. 458, 1922.

Or dabbling in
Water all
Slip sliddering through toes—
(Nicer than
Through fingers though why
No one really knows.)

Coming now to the beginning of the affective life, we commonly use the term 'feeling,' to express bodily welfare as we become aware of it. We all know that some days we feel better than other days. Sometimes, for no apparent reason discoverable, we almost feel ecstatic. G. Stanley Hall often referred to it in his works as 'euphoria' and the term has come into very convenient use. Contrariwise, we feel blasé, or affectively indifferent to the point of boresomeness. What we are trying to picture here is not necessarily a definite mood or an emotional response to a given situation, as when an entertainment or party becomes boresome, but just the general background of feeling which is sometimes not clearly defined at the moment. It more often has to do with the physiological condition in which we temporarily find ourselves. This fact doubtless led many of the writers whose works we have passed in review to speak of the emotional life as indicative of general bodily conditions. It is here that perhaps a more definite relationship to the organic sensations can be made out. When this particular feeling becomes attached to definite sensory experiences, then we have the term that Wundt so well describes as a 'sense-feeling.' Titchener followed the practice in his texts and called all those experiences sense-feelings which involved an invariable connection between sensory compounds and affective responses. Headaches, hungers, nauseas, indigestions, tickles, itches, fatigues, and the like are good examples. In other words, whenever a sensory group emerges with a definite affective tone attached, the term has a legitimate place in our classificatory scheme of the affective life. "I feel satisfied," when I have eaten a hearty meal; "I feel thirsty"; "I feel dizzy"; are all good examples of sensory combinations definitely colored affectively.

Then there are some usages which either border on the obsolete from the scientific point of view or are in the offing where scientific research has not yet adequately proved or disproved them. Feeling may there imply the cognitive element, though not crystallized rationally or perceptually. "I feel that he is my friend"; or, "I feel that he is right" implies a certain intuitive cognition which can not be brought out into the limelight of direct perception. The meanings here sometimes imply unconscious attitudes that are not explicit and can not be made so. Sometimes the term feeling may be used to

approach the meaning of actual judgment, when one says, for example, that he "feels that the matter is going to come out all right"; or "I feel that he is a good man for the place." The difficulty with such statements is, of course, that they are very broad in significance from a scientific point of view. And it is this difficulty that an increasingly exact study tries to prevent. Science progresses not only to the degree that it can measure and otherwise quantify its material, but also to the degree in which it can lend precision to its qualitative descriptions. There is no desire on the part of scientists to stultify themselves with an artificial language of their own. It is merely for the purpose of clarifying their own thinking and of conveying definite meanings to workers in the same field that they resort to two methods to improve the situation.

1. This end may be accomplished by the restricted use of terms which are in current usage as, for example, when the geologist redefines what he means by a 'rock' so as to include in some geographical areas large cakes of ice, or as when the physicist so defines 'work' that you can not be said to be doing any work when you are carrying a suitcase, no matter how fully loaded, along a level stretch of ground. Most golfers similarly realize that a 'green' may be brown under some conditions. It is interesting to remark in this connection that, in addition to the *definition* of terms, the scientist frequently resorts to what is called a delimitation of terms. Thus, a psychologist, for example, uses the terms sensation, image, and instinct to mean something more definite and precise than their ordinary everyday connotations. This is what has happened to practically all the terms used in the description of the affective life. It might be helpful to point out here that one of the most radical changes has thus been made with the word "affection."

The reader may have already noticed that the word has acquired a technical meaning. In daily life affection is practically equivalent to love or fondness. But in psychology it may refer to the simple quality of unpleasantness or disagreeableness as well as to the aspect of pleasantness or agreeableness in experience.

2. The scientist may invent or coin new terms. Thus, the name kinaesthesis, for the motor sensations and imagery, has come into very wide usage. The term is not found generally in conversation or in the ordinary literature. The same may be said of the term empathy, which, from its Greek derivation, means 'feeling into' the situation or object. Numerous other terms have become very serviceable in psychology and a few of them have crept into everyday speech.[1] Some terms taken from other languages

[1] A good example of the popular adoption of a scientifically coined term is the word 'moron.' It was first proposed by Professor H. H. Goddard of Ohio State University and adopted in 1910 by the American Association for the Study of the

than our own have to be accepted bodily without translation to preserve their original significance, just as we have annexed terms from foreign languages, like *par excellence* or *Aufgabe*, for which we have no adequate translation.

It is, therefore, our present concern to straighten out some of the tools of description which we have been using, to sharpen their edges, as it were, and in some cases to invent new ones which may be used effectively. At the same time we shall become acquainted, at least in a preliminary way, with the fundamental phases of the entire affective life. The several terms which we have been using somewhat interchangeably will receive their proper and generally accepted meaning, and their further discussion and application will have a fair chance of being better understood.

2. The Affection or Simple Feeling.—The broadest possible concept, covering the entire gamut of feeling in its more restricted sense, we shall call the affective life. By this we may designate all types of experiences which involve a feeling tone to any degree and of whatever character. Naturally, when we come to fundamental concepts like feeling we are driven with our backs to the scientific wall and we are unable to define except in circular language or argument, or in terms of citation. In other words, we shall be compelled to use terms or concepts in the definition that we are trying to erect or else we are forced to give examples, illustrations, and nothing more. So by saying that the affective life shall be considered all inclusive of feeling or affective response, we can not avoid the intimation of a vicious circle. We shall have, therefore, to state that we must wait for the complete perusal of the book before we can fully describe, delimit, or detail what we are studying. It is possible at this stage to see, though, that we are concerned in the affective life with such experiences as: feeling moody, distraught, sad, happy, optimistic, interested, enthusiastic, angry, and the like. In it are included such characteristic attitudes as: benevolence, friendliness, antipathy, and the like. It will cover the characteristic consciousness which comes over us when we hear the 'latest' Scotch anecdote, like the supposed football song proposed by the Scotchman, "Get That Quarter Back." All the pangs of human existence, all the notes in the full range of moods, all the

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Feeble-minded. Even the poets have been inspired to use the word, as in this verse:

> See the happy moron—
> He doesn't give a damn.
> I wish I were a moron—
> My God! Perhaps I am!

intensities of so-called subjective response from the slight unpleasant itch or passing pain to the most profound remorse and sorrow at the loss of a partner in life; or from the sweetness of a grain of sugar on the tongue to the sweetness of the most blessed damsel the Creator ever composed in the world's symphony of love; all these and many more become naturalized citizens in this land of the affective life. Observe your own reactions and experiences, for example, as you read the following reputedly accurate account of a 'merry-go-round' in the money mart:

"A rather wealthy man had $300,000 invested in stocks and bonds when his broker advised him to sell out for $60,000. He promptly deposited his money in one of the most stable of banks which in the course of time passed into the hands of receivers. In the course of further time, he received 50 per cent of his deposits. He then turned around and bought back at the then current market price all the stocks and bonds which he had previously held."

Someone may remark that this individual had a free ride around the financial country. As a student of the affective life, however, you will note that in the course of these experiences he also ran the full range of the feelings. What is more important for purposes of illustration, in reading this episode you yourself have probably had a good example of the affective aspect of experience.

On another count we must clearly understand what is meant. If we reduce the complexities of the affective life to simpler terms, it should not be surmised that we are committing ourselves to a structural point of view, *i.e.*, involving a doctrine that the mind is a complex structure which may without further adieu be reduced to smaller parts. No contemporary psychologist would hold such a view. But in the same way that we may reduce a perceptual experience to simpler terms, like sensation, we may say that the variously complicated affective processes may be analyzed into simpler factors or aspects.

3. Affection as an Elementary Process.—It may be well to pause here to consider a situation which has arisen in connection with the so-called affective element or elementary feeling. Beebe-Center has presented a valuable summary of the existing literature on the affective element as such. He came to the conclusion "that the evidence is distinctly contrary to the existence of special affective elements."[1]

Similarly Bentley maintained that:

"The 'subjectivity' of feeling has always presented a paradox. In themselves the feelings somehow seem to be imbedded in the organism. They

[1] J. G. Beebe-Center, *The Psychology of Pleasantness and Unpleasantness*, p. 77, 1932.

evince no articulation, no partition, no aggregation, no explicit reference, such as we find among the sensational qualities. Nevertheless, they are projected into objects by an empathic transfer and so seem to color and to qualify nature as well as ourselves."[1]

He had already suggested the problem when earlier in the book he had observed that:

"But when we try to describe the relation of the affective *quale* to the integrated forms with which we are now familiar, we meet with a difficulty. They refuse to be 'composed.' . . . The affections do not . . . form incorporations, neither do they enter as members into the incorporated groups."[2]

In accordance with this situation, Bentley termed them not specific mental processes *per se*, but "vital indicators" which announce "from moment to moment, the position of the organism upon matters at issue." This circumstance is described in still another way by Messer, who stated that "simple feelings are, as a class, impalpable, though in exceptional cases they will bear scrutiny." When they become more closely attached to sensations they are palpable. But he joins Husserl and Stumpf in recognizing a class of affective sensations (*Gefühlsempfindungen*) and thus solves the difficulty of providing a criterion between sensations and affections on the ground of 'palpability' and outward reference.[3] Troland generalized these points of view in the statement:

"It is generally conceded by psychologists that affection never appears in consciousness alone. It always inheres in some other qualitative feature. Thus we may have an unpleasant pain or a pleasant sweetness, but not an isolated pleasantness or unpleasantness."[4]

For that reason he called the combination of an affection with other mental processes a 'feeling' and preferred to discuss them "as an attribute rather than as an element of experience."

Such statements might be multiplied, but these are typical of the situation as we have it today. The question might then be put, "Are there any affections or elementary feelings?" In a previous section (Chap. II, §5) we alluded to the inherent nature of feeling which makes it unique in the whole texture of mind and which introduces a difficulty in the analytical treatment of the subject. It is therefore not at all strange that experimental conditions repeatedly fail to present this

[1] *Op. cit.*, p. 356.
[2] *Ibid.*, pp. 135–136.
[3] *V.* E. B. Titchener, *Systematic Psychology: Prolegomena*, p. 222, 1929.
[4] L. T. Troland, *The Principles of Psychophysiology*, Vol. III, p. 225, 1932.

elementary phase to the full limelight of direct observation. But let us ask the questions, "Are sensations directly observed; has anyone ever scientifically discovered an instinct, a perception, a simple-impulsive reaction, a response mechanism, or a concept in any one experimental series?" Let us go a step farther and ask similar questions in other sciences as to whether photons, benzine rings, reflex arcs, genes, calyxes, kettle holes, and any other of the vast array of technical categories have come from direct observation under experimentally controlled conditions? These terms have to be mastered as acceptable categories before they can be comprehended, let alone directly observed. Instruction in any science involves just that. Almost every instructor has had the experience which is often recited in connection with the famous biologist, Louis Agassiz, and the student who was told to look again and again at a fish after he had reported that he could find nothing of interest. Finally Agassiz suggested that the student take a pencil and draw what "he saw." Only after repeated attempts was the student able to observe all the details that were called for. This is a truism in every specialized discipline.

And so we should answer that the case stands on similar grounds in regard to the affective process. Yes, it is elusive and it offers special difficulties, but it meets the specifications of an elementary phase of mind. These are two: (1) its irreducibility, namely, our present inability to analyze it further, and (2) its possession of a sufficient number of qualitative and quantitative attributes to give it a respectably independent status. We should recall Külpe's arguments against the Wundtian position which led to revision in 1896 of that position. Up to that time Wundt had made feeling the attribute of mental processes, which relationship Troland has more recently tried to restore. Külpe then pointed out that there were three objections: (1) in no other case can an attribute such as the affective attribute be reduced to zero and leave intact the process to which it is an attribute, *i.e.*, an attribute must be an essential attribute; (2) in no other case did an attribute have attributes of its own, *i.e.*, an attribute must in itself be irreducible as an aspect; and (3) in no other case did an attribute have a sufficient number of attributes to assure its own independent *quale*, *i.e.*, an attribute must be a simple phase of something else and not a leading construct in its own right.[1]

If, for example, a 'red' sensation has the attribute of intensity reduced to zero, the sensation naturally disappears; if intensity had further attributes it would be contrary to the definition of intensity;

[1] *Op. cit.*, pp. 227 f.

and if intensity had perchance a complete set of attributes in turn it would be an anomaly. The fact that it is then a systematic construct, logically required by the observed attributes which it possesses is quite analogous to other mental processes in the realm of psychology. Titchener puts this phase of the problem tersely when he says:

"We are, in a way, getting towards the 'real' mind, when we attack perception. But we are still well within the sphere of abstraction. Mind, the mind that we use in everyday life, is not a sum or series of perceptions; and perceptions no more occur separately, in real experience, then do sensations. The popular view is to the effect that we have our perceptions of size and shape, rhythm and scale, distance and direction, duration and frequency, pigeon-holed and labelled somewhere 'in the mind,' and that we draw them out for use, separately, as the particular occasion requires. And the psychologies, no doubt, do something to confirm such a belief, by the mere fact that they treat of perceptions one by one, in separate paragraphs. Let us, then, once and for all, throw this view overboard; and take in its place the belief--however paradoxical at first sight—that *we never have a perception*. Consciousness is a shifting tangle of processes, themselves inconstant, and the perception is a little bit of pattern ravelled out from the tangle and artificially fixed for scrutiny."[1]

In view of this traditional critique, which can not be easily gainsaid, for the present at least we must cast our vote in favor of an elementary feeling with its own set of reportable attributes. Whether you assign a long list of qualitative variables or abide by the usual pair of pleasantness and unpleasantness, pleasure and unpleasure, agreeableness and disagreeableness, these qualities are definitely experienced in connection with a wide variety of mental processes. Even if the process of elementary feeling or affection does not 'stand alone' in experience, its systematic position in psychology can be abstracted and isolated. Without going into the more abstract logic of science or into questions of methodology, we take two things for granted: (1) that somewhere in the development of the mental life the simpler factors existed before the more complex ones were evolved; and (2) that sometimes either under the conditions of analytical procedures which attentively scrutinize the parts against the whole or under isolated favorable conditions of everyday life, which perhaps for a moment bring out a simple situation, the simpler processes clearly appear.

[1] E. B. Titchener, *Experimental Psychology*, Vol. I, Pt. I, pp. 127-128, 1901. For the advanced student who wants to pursue this argument further, the following scholarly presentation will be helpful: E. B. Titchener, *Lectures on the Elementary Psychology of Feeling and Attention*, p. 83, *seq. et passim*, 1908

With that understanding we may say that the simplest aspect of the affective life is called an *affection* or *simple feeling*. Kiesow prefers the term *elementary feeling* because "every elementary feeling may be conceived as a simple feeling, but not every feeling, appearing as a simple feeling, is an elementary feeling."[1]

This term denotes the barest pleasantness or unpleasantness as a mere quality of experience. Later on we shall have to face different theories in regard to the matter, but for the present we voice the consensus of the majority of psychologists that there is such a simple affective experience.

4. Affection as Sensation.—Temporarily, too, we shall have to pay attention to another recently taken position that the affective element is equivalent to certain sensations. Historically, as we have seen, the common allusion was to 'pleasure and pain.' When in the course of further development pain became a sensation and was distinguished from feeling, other sensations came to be considered as substitutes. Stumpf was responsible for making them special attributes of certain 'feeling-sensations,' or *Gefühlsempfindungen*,[2] the pleasant hedonic tone being attached to tickle, itch, euphoria, sexual and other systemic sensations and the unpleasant hedonic tone being the affective aspect of purely bodily pain. Both of these qualities can be attached also to sensations of the other sensory groups. Bourdon[3] had already related pleasantness to tickling in 1893 and in 1894 von Frey[4] had identified pain as the simplest form of the feeling of unpleasantness and pleasantness as coming with the avoidance of pain. Recently in several articles Nafe has revived the notion. He makes mild pleasantness a bright pressure or a touch quality lying between bright pressure and tickle vaguely localized in the upper part of the body; mild unpleasantness is a duller, heavier pressure localized in the abdomen or in the lower part of the body.[5] Going a step forward, or historically backward, he claims "that the affective and emotional experiences are fundamentally similar to other ('sensory') felt experiences" and "that the proper name for this modality, including cutaneous, kinaesthetic, organic, affective, and emotional experience, is the sense of

[1] F. Kiesow, *Feelings and Emotions: the Wittenberg Symposium* (ed. by Reymert), p. 90, 1928.

[2] C. Stumpf, Über Gefühlsempfindungen, *Zeits. f. Psychol.*, 44, 1907, pp. 1–49.

[3] B. Bourdon, La sensation de plaisir, *Rev. philos.*, 36, 1893, pp. 225–237.

[4] M. von Frey, *Die Gefühle*, pp. 14 f., 1894.

[5] J. P. Nafe, An experimental study of the affective qualities, *Amer. J. Psychol.*, 35, 1924, pp. 507–544; The psychology of felt experience, *Amer. J. Psychol.*, 39, 1927, pp. 367–389.

'feeling.'" For a critical résumé of these findings we shall have to wait for the next chapter, but it ought to be noted here that at the present writing there is a considerable uncertainty, in some quarters at least, concerning the systematic independence of the elementary feelings.

For the present, then, we may state our position as being in favor of the fundamental category of *affection*. The Külpe critique still stands intact and unassailable even in the face of these newer investigations. The specific reasons will be presented later. Now we may set forth a preliminary and very general thesis that, regarded from all

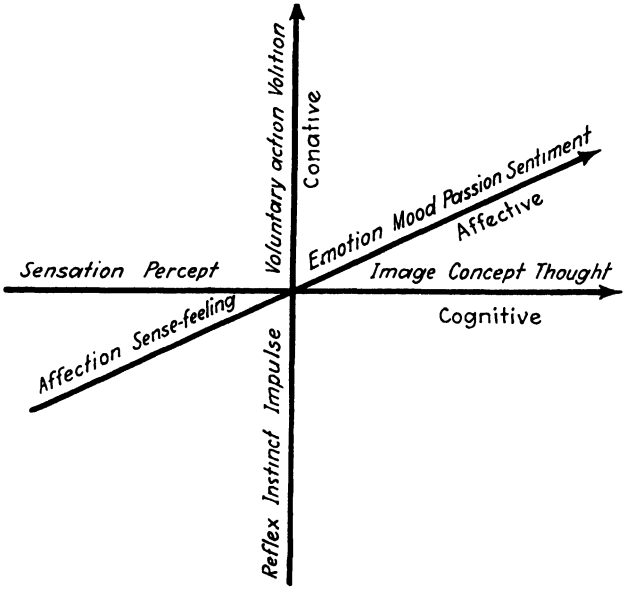


FIG. 2.—Symbolic dimensions of mind

sides, the mind may be viewed from three angles, according to which it will present three aspects or dimensions. Without apologies to a trained understanding of the limitations involved in diagrammatic figures,[1] we may say that the mind may be regarded as a cognitive entity, a conative entity, or an affective entity (see Fig. 2). From the cognitive angle it is aware, conscious, sensitive, alert. It knows objects, situations, events, and relations. At times it also knows itself and the body as the next-door neighbor to itself.

From the conative angle it responds, acts, expresses, executes, and accomplishes. No direct causal relation need be implied here since

[1] *V.* C. A. Ruckmick, A new classification of tonal qualities, *Psychol. Rev.*, 36, 1929, p. 172.

it is quite possible to say in better language that it is correlated with all types of organic movement as a dynamic or functional counterpart of itself.

Finally, from the affective angle it also feels, is 'subjectively' moved, excited, depressed, pleased, displeased, and the like. In any one concrete and momentarily abstracted bit of experience all three phases may be comprehensible. In a perception of a football, there is principally a cognition of the object as a visual presentation; there may be involved, however, motor or conative elements, incipient kinaesthetic impulses to kick the ball, and there may be also affective elements of pleasantness or unpleasantness depending upon the general trend of recent or vivid experiences, through either the winning or losing of a game, the ability or inability to kick the ball successfully, or the possession or lack of possession of keen interest in it. The experience in its rapid passage is a unified whole. In the same manner an emotion of fear, which is primarily an affective experience, has the cognitive element of the perceived or conceived object, circumstance, or event as a component aspect and the expressive movements and postures together with all reflex changes as the conative aspect. A significant phrasing of this important relationship between emotions and the cognitive processes may be found in Martineau's ethical studies.

" . . . passion and emotion themselves are, in ourselves, not without thought, and may be always treated as *thought in a glow*."[1]

Likewise a conative movement in turning the page, if it has not been too much habituated and therefore consciously deflated, has in it also the cognitive aspect of the last line of printed matter and the leaf itself, but also the slight thrill of expectation of the affective sort to see what the next few words will reveal. How often is that thrill played up in comic strips, continued stories, or the chapters of a mystery novel. So often the labeling of an experience is a question of more or less—more of the cognitive, less of the affective, and sometimes none of the latter. This fundamental fact may be illustrated both by way of the genetic growth of mental processes and in the full-fledged processes like emotions and instinctive performances in the lower animals and in man. It may also be the reason for the tendency to reduce moderate affective processes to the level of 'felt' or cognized experiences.

5. The Development of Feeling.—Now let us face the problem from the genetic point of view of mental development, and the picture will become outlined in sharper relief. Accumulated evidence supports

[1] J. Martineau, *Types of Ethical Theory*, 2d rev. ed., Vol. II, p. 468, 1886.

the view originally held by Ribot,[1] that the first evidence of an awakening consciousness was the merest and vaguest sort of feeling, which was then largely referable to bodily condition. We can not tell precisely in what animal form this first occurred; but let us say that we have a condition of warm *vs.* cool water as a determining factor for the movement of simple-celled animals. If the animal moved toward cooler water it was not because it sensed coolness but because the cooler water produced internal conditions which reflected a vaguely more comfortable feeling in terms of an undifferentiated consciousness. Since such animals have no nervous system in the generally accepted sense of the term, we should have to imply that this simple awareness required no specialized tissue or organ in any present-day meaning of the word. We should also have to imply that mere cell tissue in the animal form was a sufficient vehicle for the mediation of these simple affective states. Here, then, we should find simple feelings or affections and nothing more. Ribot infers that this type of conscious experience may also apply to the human child in the intrauterine period.[2]

6. The Rise of the Sense-feeling.—Presently there gradually emerged a combination of this simple feeling of pleasantness or unpleasantness in connection with a general common sensation of the order of the sense-feeling above described. Here again the principal, perhaps the only meaning or significance, was the condition of the organism itself. These sense-feelings referred to bodily wants and satisfactions. They were not differentiated into different sensory qualities but represented common sensibility of a type which is no longer represented in our more highly developed human mind, or perhaps is an occasional vague possibility in some moments of experience. These sense-feelings have in common Nafe's *quale* of 'felt' experience and would include, as he does, the present cutaneous, subcutaneous, muscular, organic (or systemic or coenaesthetic) qualities like those implied in the German term *Gemeingefuhl*, or common sensation.

The next step in the development of the affective life came with the increasing distinction between sensory qualities, when appropriate sensory organs were gradually developed. These sensory organs functioned more and more in connection with outside or extraorganic conditions and referred to objects that were at first just without the body wall, when this was projected and extended by means of specially modified structures, and later to those objects which were at some distance from the organism. In this process the true cognitions of a perceptual order first began to appear. From the affective angle the

[1] *Op. cit.*, p. 3.
[2] *Ibid.*, p. 8.

cognitions became more and more independent of feeling as they themselves developed more definitely and complexly. To take a concrete instance, a leaf or some foreign organism would be at first sensed with a strong feeling tone, schematically not much different from the sense-feeling arising from within the organism itself. It would mean at once a satisfaction of bodily want or an unpleasant condition involved in the detrimental or inimical situation of the environment.[1]

When, however, the senses were more intricately organized the youngly developed mind represented by this small animal would soon be able to cognize such possible sources of food as leaves and other organisms, at times when the organism was well nourished and satiated. In this case the cognition would take place without the feeling component. Frequent encounters of this sort would lead to an independent development of the cognitive functions, especially as they aided in distinguishing palatable food from undesirable food.

7. **The Emotional Stage.**—This independence of development continued for some time until presently another affective complex appeared on the scene: this time the incipient emotion. The emotion, by most descriptive accounts, requires the cognitive element. Putting it in common-sense language, emotions are always directed toward some object or situation outside the organism. Although the argument is somewhat fallacious scientifically, since it is based on *a priori* grounds, we may ask whether it is possible to be angry without something, or somebody, or some situation at which to be angry. There is some discussion on the subject of 'objectified' *vs.* 'objectless' emotions but most writers agree that objectless emotions are impossible. In numerous investigations in the psychological laboratory of the University of Iowa on *bona fide* anger, produced under experimental conditions, the observations clearly show that this among other emotions is always directed either toward the experimenter, toward the observer himself, who feels responsible for getting himself into this situation, or toward the physical conditions which have provoked the anger.

Naturally at our stage of mental development, which would correspond to the next phase of development in the lower animal series, we need not confine our emotions to persons, places, or circumstances which are directly and immediately perceived. Many of you have read of the dirty and miserable children in the poverty-stricken sections

[1] This is quite close to K. Dunlap's 'visceral' hypothesis as brought out in *Feelings and Emotions: The Wittenberg Symposium*, pp. 151–160, 1928. It is also in general agreement with Bentley's interpretation of the affective life as a 'vital indicator' or the emotions in general as one of the psychosomatic functions effective in a predicament, *op. cit.*, pp. 295, 356.

of Russian cities who do not know who their parents were, who pick up whatever scraps of food they can find in the gutters or in heaps of refuse, and who protect themselves in cast-off clothing or any sort of old rag, begging and scrapping their way through life at the tenderest years of childhood. Photographs are not necessary. The merest descriptive language is sufficient. But we cognize the situation fully in terms of ideas and we get with these ideas some of the most profound emotions attending squalor and human misery. Thus often we experience much more profound emotions when we let our imaginal processes roam than we do when we actually perceive conditions corresponding to similar experiences. In fact almost the entire development of the affective life has taken place under pressure of civilization in the direction of cognitions that are ideationally realized. We must not forget, of course, that, as in other phases of evolution, we can draw upon the whole equipment of the affective life that has gone before.

Our historical survey has taught us, moreover, that there is nothing base about simple pleasures provided they are balanced with other enjoyments in the social scheme. It is not sinful, at least from the psychologist's point of view, to experience pleasantness resulting from touching a piece of jade or from passing the hand over a piece of driftwood that has been worn smooth by the waves of the sea. Who has not often stopped in the playing of a piano passage to enjoy the richness of some particular tonal combination which seemed to stand out gloriously above the rest? Many an artist has admired the particular color quality used by a painter in depicting a particular bit of scenery. Not the skill, not the picture, but just the aesthetic effect of that particular patch of color was the source of pleasure. Who would deny to children and sometimes to ourselves the pleasure that comes from a mouthful of candy? During the war period when we were short of sugar some of us tasted with delight for the first time a quantity of saccharine no larger than a pinhead but many times sweeter than sugar. The only reservations which one might make are: first, a person situated in this era of refinement and culture should not be bent on the eternal quest of sensory pleasure alone: he must take his mead of punishment, disappointment, and downright unpleasant experiences on the way to a more ideal goal which he should be seeking; and secondly, an individual who enjoys only sensory pleasures is thousands of generations behind his time. He is then just a sensory animal.

But to return to the emotions, we have tried to make it clear that this kind of affective experience could not have appeared on the scene before the mind was developed to the stage of possessing a fairly complex cognitive function; that the cognitive function in turn at first was of the perceptual order; and that later on ideational cognitions were

added. If your instructor should suddenly stop his lecture and tell the class that an examination over the previously assigned material would immediately follow during the remainder of the hour, no doubt emotions would surge over you which to some of you might be almost overwhelming. It is not the object or the immediate situation which is directly cognized or affectively toned, but what you anticipate will happen in terms of ideas. The naughty boy who is scolded and then told that when his daddy comes home he will get a sound thrashing is more punished by the delay than by the pain sensations later inflicted during the interview with daddy. An instance is told of a boy whose father never resorted to corporal punishment but who sometimes could not find words to express his attitude toward what his son had mischievously done. The punishment was much more severe than that of two other boys with whom he was associated. They went home after they had broken a window, settled their accounts with their fathers, and carried their receipts around with them! The idea of what was in the mind of the father who did not thus vigorously apply the rod, coupled, perhaps, with the look on his face which, however, formed only a cue—that idea was the real cognition which caused the unpleasant experience in the mind of the boy in question.

Of course, some individuals are not so sensitive to such ideational factors as are others, and some minds are not nearly so rich in this ideational content, especially at certain ages, as are others. Some of us do not know what sacrifices our parents made for us and what sufferings they bore until we ourselves become parents in similar situations and under like conditions.

The influence of this ideational component is well borne out in some of our investigations in the laboratory. When an observer is asked to close his eyes and to hold a burning match between two fingers as long as he can before he actually feels the burn, when he may throw it away, the study of his introspective report and the analysis of the objective record obtained from his bodily reactions clearly shows a maximal effect before the actual pain sensation occurs. This leads us quite naturally to another important factor in the typical emotional complex, that of bodily activity or response. In the older and more primitive emotions this is distinctly overt and consists of gestures, facial grimaces, and incipient contractions in various parts of the body. In time, through learned responses and attitudes and also through inherited patterns of the nervous system, these overt movements may have become somewhat checked or entirely eliminated. But in all types of emotion some form of internal bodily activity almost always takes place. These are accompanied on the mental side by the corre-

sponding sensory components, usually of a kinaesthetic or motor type, which come directly from the musculature of the body. Then there are sensations resulting from merely physiological responses, like the perception of perspiration, of blushing, wetness and dryness of the throat, hands, and feet, and other more definitely organic disturbances.

Many psychologists have included additional factors or perhaps have used different ways of expressing the same thing. McDougall[1] states:

" . . . that every emotional excitement of the organism involves, beside the emotional quality and its bodily expressions, a third distinguishable factor which is very often ignored in discussions of the emotions, namely, the conative factor in the total experience."

This 'conative factor' is described as "our immediate experience of striving." He claims that "it is distinguishable or introspectively recognizable just because it so varies in intensity." Still other psychologists have typified this aspect by saying that emotions are executive in function in that they tend to do something by way of adjustment to a given situation, even if to do something means to do nothing. You may recall the discussion in the historical chapter concerning the active and passive emotions. This is now reduced to what we might call the active and passive aspects of all emotions. Bodily expressions result, but mental activity of considerable proportions is also involved.

Let us mention another aspect of the emotional experience as contrasted with other phases of the affective life, namely, its characteristic temporal course. The typical emotion occurs as a sudden disruption of both the mental and, to a large extent, the bodily life. It is characteristically an autocratic sort of affair, holding mandates for the time being over all other functions. It has often thus been called a seizure, or, according to Dockeray, "a breakdown in organized behavior."[2] For example, Ladd and Woodworth take cognizance of this suddenness of arousal as a specific characteristic of all of the emotions.

"All emotional forms of feeling are accompanied by abrupt and marked changes in the character and time-course of the mental train. Such changes may be regarded as standing in the relation both of cause and of effect to these feelings. Some impression with which strong feeling has become associated is made upon the mind; the result is a transitory interruption of the mental equipoise. This constitutes in part the justification for the saying that from mere feeling to affection is a 'leap.'[3] As a rule, the effect of any sudden and surprising impression—perception of some object of sense, or remembered image—is to start the flow of emotion. Thus anger,

[1] W. McDougall, *Outline of Psychology*, p. 317, 1923.

[2] F. C. Dockeray, *General Psychology*, pp. 193–228, 1932.

[3] *Cf.* J. W. Nahlowsky, *Das Gefühlsleben, u.s.w.*, Introduction, 1862.

fear, desire, avarice, take men 'off their guard'; the feelings of such kind that are started by a given mental impression themselves produce a confusion of the mental train. But, on the other hand, this very disturbance of the mental train is itself productive of a new phase of feeling, such as is associated with the particular ideas that in confused and hurried throngs rush into consciousness, as well as with the general stage of consciousness considered as one of haste and confusion."[1]

The term emotion does not only imply a tremendous amount of movement as we have described in the previous paragraph, but considerable commotion in the orderly array of the mental life is present.

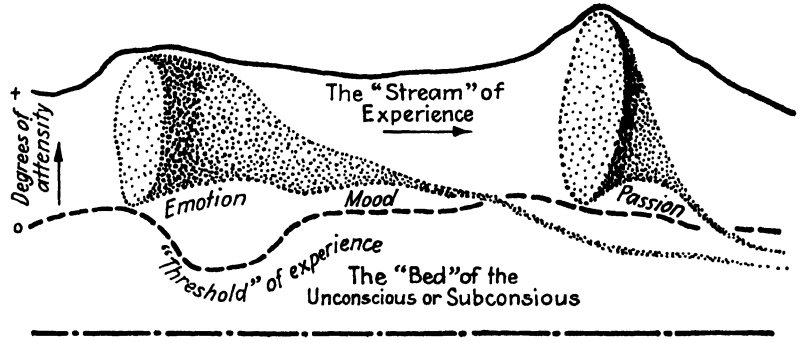


FIG. 3.—Symbolic representation of typical forms of emotion, mood, and passion. The figure should be visualized tridimensionally. It is meant to illustrate the sudden incidence and gradual submergence of these affective processes, even at times in the latter event, below the level of experience. The stippling (somewhat in perspective) indicates a diminishing degree of hedonic tone with passage of time.

Putting it negatively, we may say that there is no mental process which is going on at the time that is not suddenly stopped in its course or that is not so altered as to be absorbed in the emotion when it sweeps over consciousness. Positively we may say that the emotion when it comes into the mental life assimilates all mental processes which are present at the time. This all-inclusive function of the emotions has been recognized by many writers. It is embodied in our poetic literature and in the proverbs of all languages. Even so trite a phrase as 'love is blind' indicates how all absorbent the emotion of love, like other emotions, is. When you are happy, everything is rosy, optimistic, and full of sunshine; when you are sad, the world becomes gloomy, pessimistic, and full of fog and mist.

This sudden change is best represented by a conical scheme like a funnel-shaped opening at one end, tapering off at the other with the small end in the direction of the current (Fig. 3). The suddenness of

[1] *Op. cit.*, p. 522.

its appearance in the stream is indicated by its largest diameter. This will illustrate the intensity and complexity or, in other words, the richness of the experience at the very beginning. It will also describe the tendency of emotion to pull in all current mental processes. As time goes on and the flow of consciousness proceeds, the emotion becomes less and less intense and not so complex until it wanes again when, on some occasions, a new emotion may arise. In fact there may be a whole succession of emotional episodes, each one of which would distinctly fit into our generalized picture.

Then, too, we must remember a further characteristic of the emotions which has been more or less implied but which we must, nevertheless, explicitly state, namely, the fact that an emotion generally is experienced at a high level of attention. This may have been suggested by the previous description that the emotion seizes everything in consciousness at the moment and makes it its own. Some forms of consciousness do not run their course at a high level of attention. When we are doing things habitually in a routine fashion or when we are in a 'brown study' we may not be very alert. But an emotion that goes off in a half-cocked fashion is a contradiction in terms and never, indeed, naturally occurs. All characteristic emotions are run off at a very high degree of attention. This is as it should be if we take the biological function of emotion into consideration, namely, that it helps to readjust the organism during an emergency. Any animal that has not fully paid attention, as it were, to the situation, that has not quickly harnessed its resources at a high level of alertness, has simply passed out of the picture. Can you imagine any emotion that you have ever experienced in a half-sleepy condition? Perceptions may be distorted; actions may be exaggerated; but feelings are intense and mind is 'all there.'

There is another factor which must not be overlooked. After all, an emotion is what it is because of its affective tone. It must be either pleasantly or unpleasantly colored. This is as extensive as the process itself and is in fact its very texture. Pleasantness may alternate with unpleasantness in slow succession or with great rapidity. But to leave the affective tone out of an emotion would be like leaving sensation out of perception or the image out of the idea. It is an intricate aspect of the whole complex experience and fundamentally gives it its name.

8. The Growth of the Mood.—Now we come to two related affective processes, which can be represented in connection with the emotions. The first of these is mood. In the genetic scheme presented either it would take its place as a cross between a sense feeling and an emotion,

as though it were not yet a full-fledged emotion; or it might be considered as a degenerated or decayed type of emotion, one that sometimes follows in the wake of an emotion, like a long attenuated tail or stem to the funnel-shaped scheme which we have just pictured. As a matter of fact, the second is probably the more plausible occurrence if we may judge from our own experiences. In the description of moods we are really much worse off even than we were in the case of the emotions. We have neither a long literature on the subject behind us, philosophical though it may be in the case of the emotions, nor any experimental work of note. With this lack of guidance from an extensive literature and with this dearth of experimental material we must proceed as best we can on the basis of general uncontrolled observations. No doubt we could get some help from published diaries on this point but the scientific merit of such source material would be exceedingly doubtful.

A mood has only the general affective tone and some of the bodily symptoms in common with emotion. Otherwise it stands in direct contrast to the typical emotion as defined. It is not sudden but usually long drawn out, lasting sometimes for hours, occasionally for days. Pillsbury here gives in part a contrasting portrayal:

"Mood is a predisposition to an emotion of comparatively short duration. It may be due to physical causes. Lack of sleep, a fit of indigestion, and many other indispositions predispose to unpleasant emotions, while good health and rest conduce to pleasant emotions or sentiments. Moods, too, develop from earlier emotions. A disagreeable emotion . . . leaves a tendency to other unpleasant emotions, and this is a mood."[1]

It has no particular cognitive element. We are often at a loss to say toward whom or what it is directed. By the same token it does not generally seize the whole of consciousness. It stands quietly in the corner, as it were, while the conscious parade goes on. That it has some effect on the rest of consciousness there can be no doubt. Its presence is noted; it is a silent junior partner to the mental life of the moment. But certainly there is no seizure, no tyrannical control, no obvious intrusion. There is also generally no conative impulse about it. It does not lead itself to any definite action. Biologically its function is hard to determine. Positively one might state that it is probably more allied to physiological conditions than to direct experience. But certainly many moods are occasioned through circumstances which have occurred in experience—a series of mishaps during the day, a stroke of luck in many enterprises, a gay evening with many pleas-

[1] *The Fundamentals of Psychology*, pp. 504–550.

ures; all such experiences are provocative of moods. But some moods are casually ascribed to indigestion, to a bad liver, or to getting out of the wrong side of bed in the morning.

We must note here a recent tendency to account for the characteristic mood or disposition of the individual in terms of physiological mechanism and chemical secretions. In Berman's presentation of the matter the endocrine or ductless glands are the successors to the classical theory of the 'humors' of the body, which is attributed to Galen (130–200) although current for many centuries before his day. Too much thyroid secretion leads to increased excitability whereas too little thyroid secretion leads to dullness, depression, and mental stupidity. The secretion of the posterior portion of the pituitary body controls the excitability of the involuntary muscles. The function of the thymus is not so well made out but possibly since it is concerned with the process of maturation the persistence of a childish disposition may be attributed to its belate influence.[1] Of this attempt Paterson says:

"Berman, with deceiving rhetorical skill, weaves truths and speculation into a fascinating pattern which leads the uncritical reader to a ready belief in Endocrinological Characterology as a thoroughly established and empirically verified discipline "[2]

Other things that might be said about a mood are that it has a low degree of attention and that its affective tone is relatively slight—mildly pleasant or unpleasant, but never very intense. This is the best tentative picture of mood which we can sketch at the present time.

9. The Emergence of the Passions.—A contrasting picture is presented by the passions, which again have neither been adequately described in the literature nor experimented upon in the laboratory. But we can say three principal things by way of indirect analysis. They are extremely intense in affective tone, they are as sudden in subsidence as they are in appearance, and they are usually vastly richer in action and expression than are even the emotions. Passions are outgrowths of emotion with the hedonic tone particularly stressed. While we may not be able to hear or to see accurately when we have flown into a passion, we must, however, say that the cognitive element is there. We do see and hear and the passion, unlike the mood, is directed toward some person, object, or event. Its adjustment to the situation is probably not nearly so efficient or effectual but there is a more or less disorganized response.

The terminology is not always clear, but let us imagine what happens when a man flies into a rage. The first thing we say is that

[1] L. Berman, *The Glands Regulating Personality*, pp. 210–224, 1922.

[2] D. G. Paterson, *Physique and Intellect*, pp. 239–240, 1930.

he is not himself. The disorganization is so complete that the customary behavior of the individual is more or less entirely submerged. It is as if another person had taken his place. Many of the names used for passions, like rage, are simply exaggerations of other names generally used for emotions, like anger. The same thing holds for the passion of ecstasy as compared with the emotion of joy. On the other hand the name passion is often loosely used for emotions that can hardly be called passions, when they are of great intensity, as when we say, "I am passionately fond of this book"; "I am passionately absorbed in this job." To get a true picture of a passionate experience, we should recall either an experience of our own or one which we witnessed in another. This experience should rock the very foundations of our being, make us take on characteristics of behavior which may have been latent in normal occurrences and in which we are transported to an entire new level of mind and body, with the primary requirement that the affective component is extremely strong, very pleasant or very unpleasant. The experience should also be relatively short of duration and one to which, in a certain sense, we are maladjusted in terms of response.

One further requirement should be that the associative life is not blended with the experience at the time, as it is in the case of the emotions, but is a totally disrupted affair. In many emotions, as we have seen, ideas are an integral part of the emotion and there may be even a train or a cluster of associated ideas; but in the passion the normal train of ideas is practically entirely swept away. Some may come in flashes momentarily without the usual logical sequences and more or less in the form of an explosion. This is portrayed to us frequently after the passion has subsided, when we can remark upon the fact reflectively that the ideas which were present were few in number and incoherent in sequence as compared with the normal series of ideas.

We have learned, too, not even to attempt to reason with another who is in a fury, let us say, or who is passionately in love; whereas we can do this to a certain extent with persons who are joyous or sad or even angry. Sometimes we describe an adult person who has flown into a passion as being childish in his responses, largely because reasoning with him does no good in view of the fact that the person is not capable of reasoning. One is reminded here of the characterization made by Goethe concerning a contemporary English poet, Byron. "When he reflects," said Goethe, "he is a child."

10. The Appearance of the Sentiments.—There is another and further development of the affective life which we must now consider.

Some psychologists like James call them the 'subtler' emotions. Seashore refers to them as the 'gentler' emotions. These are generally called sentiments. They are modifications of the affective life in terms of the cognitive processes of imagination and thought. Let us return to the well-developed organism. It now has the capacity to perceive and ideate. The ideational processes become more and more complex and elaborately transform the whole of the mental life, especially with the introduction and intimate use of language. This is particularly noticeable in the ontogenetic development of the individual. As a person grows older his mind is buried more and more in ideational interpretations of his past, present, and future environment. When a person is absent-minded, it is because he is temporarily inattentive to perceptual appeals from the immediate environment and attentive to the highly intellectual processes with which his mental life is furnished.

Let us take an instance which is by no means unusual with highly cultivated and reflective minds. The late Professor Hiram Corson, of Cornell University, one of the most learned scholars of Shakespeare in his day and intimately familiar with the writings of most of the outstanding men in English literature, liked nothing better than to hire a cab and take a ride around the countryside with Mr. Shakespeare or Mr. Tennyson. His affective reactions were less centered around perceived objects as they came in, although he may have sometimes enjoyed a marvelous painting or a masterful symphony. His enjoyment came through his intimate biographical and literary knowledge concerning these writers, with whom he preferred to associate himself and who were, therefore, his constant intellectual companions. Of course, we would classify such experiences as hallucinatory but even in the quiet moments of our lives such affective experiences are not uncommon. They must be increasingly common as we grow older, when we shall cherish again the experiences of our youth.

Sentiments are, therefore, affectively toned ideas, where the cognitive element is comparatively strong, at least highly attended to, and the feeling tone is attached to some meaning or significance rather than to the sensory component itself or the physical object perceived. A degree of abstraction has occurred that is one step removed from the object itself. Sometimes the sentiment is attached to a relation between objects. Two of our friends have recently been married. They seem to be very well suited to each other and they embark upon their newer responsibilities with much hope and enthusiasm. We say that the relationship is a beautiful partnership. The sentimental appeal here is not so much the attractiveness of the young lady or the

handsomeness of the young man or their individual intellectual and personal characteristics; it is rather the relationship between them which is rich in beautiful and appealing qualities.

Let us take another instance. When the writer was in Europe during the outbreak of the World War he felt terribly cut off, not only from all sources of reliable information, but from his own relatives and friends. He had no passport, since in those days it was not customary to have a passport in relatively civilized countries. But here was all this activity going on around him, long trains of artillery and field equipment thundering over iron bridges, and he was not a part of the general scheme. Although the general populace was very friendly and he slept many a time with some young man who was eager to go to the front, he was, nevertheless, a foreigner. One Sunday morning, as he was desperately trying to get even a temporary passport, he saw the United States shield on the outside of the United States Consulate in Mainz. Never before did that shield look so good to him, and when he saw the American flag again in Rotterdam it looked even better. We are not concerned here with this intimate experience, which we could sketch in much more detail, but it strongly points out the lesson of the sentiments. Here is the American emblem of the stars and bars. On some occasions we can attach to it an aesthetic feeling and say that the original designers did a good job in relating the field of stars to the larger field of the bars, or in their selection of colors. This would be an example of an aesthetic perception of the flag involving the sentiments of beauty. That is already a step in advance of the appeal which the flag may have as an attractive object in itself. Working out such relationships as balance, composition, and color contrast takes us a step away from the inherent appeal of the object as it suddenly comes to view.

But in the experience described not the attraction of the object itself, as when we first see a snow-capped mountain against the deepest of blue skies, not even the recognition of the flag as involving certain artistic proportions, but now the flag that in a strange country means "my country, where I belong." The main lesson derived from these instances is the attachment in the sentiment of highly toned affective experiences to ideational processes that refer to meaning several steps removed from the actually perceived object. Here as elsewhere we have to guard against the broad conversational use of the terms sentiment, sentimental, and sentimentality. These words have come to mean the general feeling tone or in some cases an excessive show of feeling. They are not used in the technical sense of ideational processes suffused with feeling but refer to certain habitual responses when they

become excessively saturated with feeling. The term is legitimately used in connection with the whole group of aesthetic and ethical attitudes.

11. **Summary.**—Left out of our discussion thus far are the dispositions and the temperaments. They were touched upon in the genetic description of the moods. But these affective processes are not mental processes, or experiences at all; they are rather affective characterizations of the personality or of the individual as a whole. They come from social requirements and attitudes. More light will be thrown on this subject—if, indeed, there is any scientific light to be found at all—when we come to consider individual differences and abnormal *vs.* normal types of response.

It is safe to remark therefore that we have sketched the range of the affective life from its incipient stages to its most complex forms. We have tried to clear up the matter of terminology and of underlying concepts. In the perspective of psychological development we have seen the need for an elementary concept of affection or simple feeling. At least out of the four meanings of feeling, one has emerged that has a circumscribed status and with it we can rise to higher levels.

Probably the clearest view of the entire range of feeling has come to us from the rapid survey of its phylogenetic development in conjunction with an ever present and ever more complicated environment. In this growth we realized a paradoxical situation: the semaphore of internal ease and discomfort became the warning signal of external predicaments. As the mind with its accompanying bodily structures became more complex, new phases like perceptions and ideas were gradually involved. From the simple hedonic tone through sense-feelings and emotions the affective life grew to encompass moods, passions, and sentiments. The last reach into the realm of the abstract idea and of reasoning. Not a significant mental process therefore remains untouched by affection. Our next concern is to come to closer quarters with this fundamental concept of elementary feeling and to learn if we can what is its present position in systematic psychology.

Review Questions

1. Give several instances of the gradual standardization of terms applied to the affective life.
2. In what two ways may a confused terminology be remedied?
3. What were Külpe's three objections against regarding affection as an attribute of sensation?
4. From what three fundamental angles may the human mind be viewed?

5. In what manner may sense-feeling be regarded as emerging from an elementary feeling?

6. Upon what essential cognitive process did the emotion have to wait for its emergence in the evolution of mind?

7. To what extent are emotions dynamic and expressive?

8. Differentiate between a mood and a passion.

9. In what two respects do elementary feelings become affiliated with the ideational life?

10. Give from your experience an instance of *affection*, of *sense-feeling*, of *emotion*, of *passion*, of *mood*, and of *sentiment*.

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CHAPTER IV

AFFECTION OR ELEMENTARY FEELING

The affective qualities appear also to be involved in our apprehension of colored objects, of sounds, of odors, of the contact of the hand with a cold railing, and of heavy and unwieldy objects. And this is as true of memory and imagination as of perception But when we try to describe the relation of the affective *quale* to the integrated forms with which we are now familiar, we meet with a difficulty. They refuse to be "composed"

M. Bentley, *The Field of Psychology*

1. Affection as Elementary Process.—The aim of every science is to make order, if not out of chaos, then at least out of complexity. As science analyzes, arranges, classifies, and organizes natural phenomena, bewilderment and confusion give way to knowledge and understanding. The cosmos that emerges seems then to have been there in the first place. That is a statement difficult to prove and with no space to prove it in. At any rate, whether or not the final outcome is orderly and cosmotic as a matter of inherent reality, we can be sure of one thing: the process of simplification by which it was realized is artificial and abstract. The simplest formulas, the most dogmatically stated laws and other generalizations upon principles, and the most rudimentary forms and functions require modification and amplification to reach the level of reality. Nothing can be torn away from the most naturalistic setting with its multilateral interrelations and ramifications, either physically or conceptually, without immense oversimplification and therefore distortion of fact and of truth. All this fits into the modern exposition of relativity, but it is also here to the point. While it is extremely difficult if not impossible to abridge Whitehead's point of view and his everlasting contributions to critical thought, the following passage will aid us in clearing up our notion of psychological fundamentals:

"My point will be, that we are presenting ourselves with simplified editions of immediate matters of fact. When we examine the primary elements of these simplified editions, we shall find that they are in truth only to be justified as being elaborate logical constructions of a high degree of abstraction. Of course, as a point of individual psychology, we get at the ideas by the rough and ready method of suppressing what appear to be irrelevant details. But when we attempt to justify this suppression of

irrelevance, we find that, though there are entities left corresponding to the entities we talk about, yet these entities are of a high degree of abstraction."[1]

Thus he demonstrates what he has just called the "fallacy of misplaced concreteness." Elsewhere he has given it even broader scope:

"This fallacy consists in neglecting the degree of abstraction involved when an actual entity is considered merely so far as it exemplifies certain categories of thought. There are aspects of actualities which are simply ignored so long as we restrict thought to these categories."[2]

In a totally different context, namely that of biology, General J. C. Smuts makes a similar contribution to our thought. He argues that in several respects we have forgotten the intellectual error which we committed in

"narrowing down all concepts into hard, definite contours and wiping out their indefinite surrounding 'fields.' The concept of 'fields' is absolutely necessary in order to get back to the fluid, plastic facts of nature. . . . Concepts were in logic as well as in science narrowed down to their most luminous points and the rest of their contents treated as non-existent. . . . One of the most salutary reforms in thought which could be effected would be for people to accustom themselves to the ideal of fields, and to look upon every concrete thing or person or even abstract idea as merely a center, surrounded by zones or aurae or spheres of the same nature as the center, only more attenuated and shading off into indefiniteness."[3]

We should not have dwelt so much on these newer attitudes in regard to science were they not so significant for our own subject in hand. Affections, or the elementary feelings, are therefore nothing more than (1) convenient abstractions created for the purpose of greater elucidation of our whole problem and (2) foci of greatest luminosity gradually shading off into less distinct bearings outside our particular 'field.' With that attitude understood, it matters little or nothing whether we take a structural, functional, dynamic, reflex, behavioristic, configurational, or any other point of view. Affection becomes simply a psychological construct, a creation helpful in the systematization of our knowledge of the mental life. It is the irreducible minimum to which the entire range of the affective aspect of experience may be analyzed. Now, what about its present status?

[1] A. N. Whitehead, *Science and the Modern World*, pp. 76–77, 1926.
[2] *Process and Reality*, p. 11, 1929.
[3] *Holism and Evolution*, pp. 1–2, 16, 19, 1926.

As we have indicated, there are three possibilities: (1) it may exist but only as an attribute of some other mental process or processes; (2) it may remain on an equal footing with other elementary processes, such as the sensation and the image; or (3) it may have to disappear altogether because it has been converted or transformed into another category, namely, that of sensation, or at least a particular group of sensations. We have already partially gone over some of these possibilities in another connection, but now let us face the evidence and the claims derived from the evidence.

2. Affection as an Attributive Phase.—When experimental psychology, such as it was, first came to be systematized in the monumental works of Wundt, the affective aspect took its place as a 'feeling tone' of conscious processes. His position is clearly announced in the first edition, when he contrasted the *isolated* analysis of sensation, or, indeed, of its more abstracted attributes of quality and intensity, with the *related* condition in consciousness. To translate:

"This relation we name *sensory feeling* or indeed also the *feeling-tone of sensation*. The latter phrase, in analogy to clang-color or color-tone, is a transferred expression."[1]

This interpretation was steadily maintained with slight verbal changes until, the *Grundriss* was published in 1896. But the story is not quite so simple as that. Hollands has stepped off three more or less distinct periods of development in the Wundtian position. For some time the subjective aspect of feeling was stressed in opposition to the objectivity of sensation, first on epistemological grounds, then on an intrinsically mental basis. During the first period (1874–1882), sensation was the only primitive element and out of it intensity, quality, and feeling tone could be analyzed. But the feeling tone was not an essential attribute—it was a supernumerary adjunct. Also it was dependent on the other two attributes. It still retained its subjective aspect in that it represented the way the cognitive contents are consciously assimilated into the whole mental fabric. The second period (1883–1888) introduced the problem of the analysis of feeling and added to it two attributes of its own, quality and intensity. In the third period (1889–1921) feeling appeared as an independent element representing the subjective aspects of experience where sensations represent the objective aspects. This view was systematically treated for the first time in the original edition of the *Grundriss*. It was later

[1] W. Wundt, *Grundzüge der physiologischen Psychologie*, p. 426, 1874.

incorporated in the larger work, the *Grundzüge*, in its fifth edition (1902).[1]

In this period elementary feelings, like sensations, became primitive facts of consciousness. Wundt's reasons for making this change are stated as follows:

1. Feeling, unlike sensation, has no objective reference.

2. Experience as a whole has both an objective and a subjective aspect: sensations are the elements which represent the former aspect, while feelings are representative elements of the latter aspect.

3. A feeling which is attached to a sensation does not show a concomitant variation with that of the other attributes of the sensation, namely, quality and intensity and, therefore, can not be, like them, an attribute of the sensation. This amounts to the principle of independent variability.

4. Affective or volitional aspects are always connected with some sensory or ideational content, but the connection is in affective tone: therefore the relationship, like that of attribution, is not a necessary one. Also the same feeling may be attached to other processes.

The student will realize that some of the objections advanced by Külpe (see page 60) had apparently hit the mark. Henceforth feeling or affection, while not an independent process, because of its inherently affiliated nature as an attached process to other, especially cognitive, processes, had now been given independent rank and status. The moving picture of this systematic development, while difficult to trace through Wundt's voluminous writings, involves at no point fundamental reversals of doctrine. Titchener, in his critical review of the matter, says

"The germs of the changes are invariably, I think, to be found in the prior Wundt, and the changes themselves are but the full and self-conscious maturity of ideas that had long been 'incubated,' had long been held in the obscure margin of consciousness."[2]

Titchener in substantiation of this point shows that as a matter of historic fact Wundt "returned to his first systematic position." For in 1874 affection was not an attribute of sensation, but the *relation* which sensation holds to consciousness at large. In 1880 it became

[1] E. H. Hollands, Wundt's doctrine of psychical analysis and the psychica elements, and some recent criticism, II. Feeling and feeling analysis, *Amer. J. Psychol.*, 17, 1906, pp. 206–226.

[2] E. B. Titchener, The tridimensional theory of feeling, *Amer. J. Psychol.*, 19, 1908, pp. 213–231. Titchener gives Külpe credit for the criticism, noted above, as an "external stimulus," but "Wundt would have formulated his new affective theory in any event" (p. 215). This reference is also to be found in Titchener, *Lectures on the Elementary Psychology of Feeling and Attention*, pp. 125–168, 1908.

an attribute of sensation, a claim which was retracted for the final position as a tridimensional reality of consciousness and systematically on an independent footing.

When, therefore, affection emerged in 1896 as an elemental process of consciousness, Wundt entered it in his tridimensional scheme with a caveat. Unlike the sensations, which fall in several distinct categories, the feelings are qualitatively all interrelated in one three-directional manifold. The names given to the three principal axes are simply indicative of the poles with reference to which the feelings may steer their temporal course or in accordance with which they may at any moment be analyzed. This affords, first of all, a tremendous possibility of qualitative change from moment to moment, secondly, an almost unending multiplicity and gradation of quality, and thirdly, an inherent interrelation or community of quality. These three principles are called for in the first place, because the affective processes are the subjective phases of an ever changing and complex consciousness as a whole and of its several cognitive and volitional aspects; in the second place, because introspections of the emotions and of the total feeling (*Totalgefuhl*) reveal a great variegation of the affective life; and in the third place, because all these feelings belong to a single aspect of the mental life. Accordingly we still notice certain unalterable and fundamental characteristics which cling to this elemental process and make it, in spite of its coordinate standing with sensation, an elemental process *sui generis*.

3. The Tridimensional Manifold.—A careful reading of Wundt reveals an intricacy of systematization which is hard to abridge without misrepresentation or misinterpretation. The simple affective qualities, for example, are more numerous than are qualities of sensation,[1] and a complete list of them is out of the question.[2] Furthermore, the manifold which represents them offers as its terminal points only classificatory names, and any concrete feeling may belong to one, two, or even all three of the principal series designated by the three axes. The best way to visualize this situation is in terms of the diagram shown in Fig. 4. Here we see a typical complex feeling in the course of time being referred to all three major axes. Wundt called them the "chief dimensions" of feeling. But anyone familiar with a similar diagram, like the visual hectohedron, which portrays the elementary sensory experiences, notices at once that the temporal course of the affective process, a continuous change with time, is a new arrival on

[1] W. Wundt, *Outlines of Psychology* (trans. by Judd), 3d rev. English ed. from 7th rev. German ed., p. 83, 1907.

[2] *Ibid.*, p. 91.

the scene, and that its mere reference to a pole or to several of them instead of a definite locus in the system is a new systematic feature.

Even the names applied in German to designate the poles, not to mention the further complication of English equivalents for these which vary from text to text, were not definitely settled upon. Pleasantness (*Lust*) and unpleasantness (*Unlust*) are unequivocal and fixed. They are also the ones

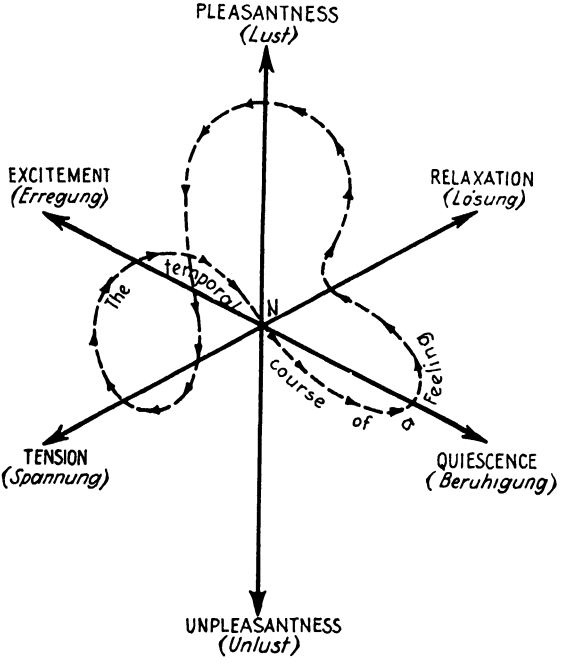


FIG. 4.—The temporal course of a feeling in the tridimensional theory of Wundt Suppose you are lying alone, stretched out on the grass at sunset. A feeling might start at indifference or neutrality (*N*), involve a calming, quieting effect of almost extreme form, pass over gradually to some vague aspect of relaxation, change then to a rich pleasantness, and, when something unexpectedly stirs in the grass, develop rapidly to an unpleasantly toned tension and excitement, and finally subside to the indifferent stage at neutrality.

generally accepted by other psychologists. But 'relaxation' as the qualitative opposite of tension or strain is not a precise equivalent of *Lösung* which may mean a loosening, a solution, a resolution, or, as the equivalent of an alternate word *Befriedigung*, 'pacification.' In the last direction of excitement-quiescence, as Titchener points out, we get close to the previously described pole through the fact that 'quiescence' is almost identical with 'pacification' or 'satisfaction.' Wundt also uses the words 'inhibition' (*Hemmung*) and depression (*Deprimierung*) for the pole opposite excitement in this last couple. It has also been translated as 'tranquilization."

There is one more ambiguity. In 1896 he had made pleasantness-unpleasantness responsible for a definite modification of the mental processes occurring at the present moment; the excitation-inhibition direction influenced specifically the immediately succeeding state of mental processes; and the strain-relaxation dimension manifested the effects of the preceding mental processes. In 1897 the pleasantness-unpleasantness axis repre-

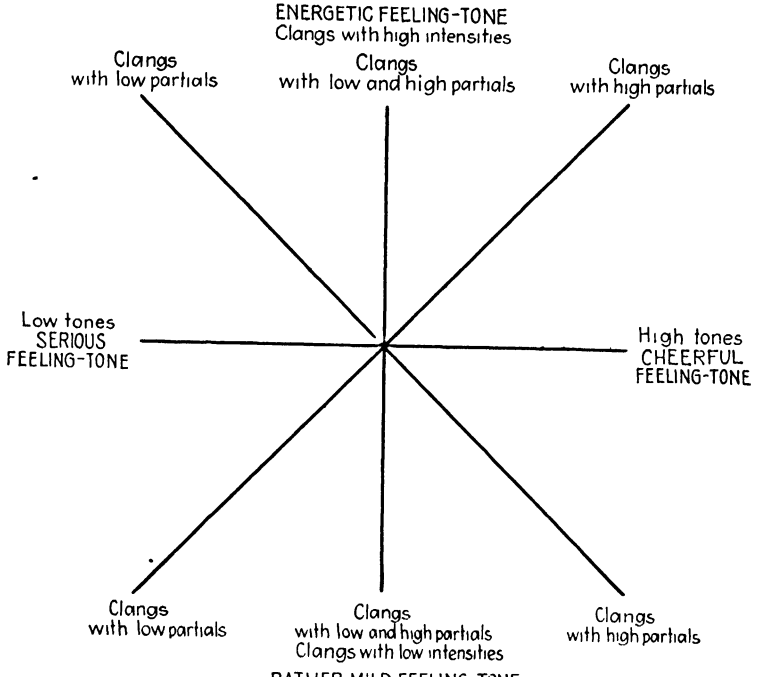


FIG. 5.—The relationship between the tonal sensations of different clang compositions and intensities and the resultant feelings (Wundt). In this case feelings depend not only on the intensive attributes, but also on the qualitative phases of sensory experience.

sented the qualitative character of sensations and ideas, the excitement-quiescence axis stood for intensive changes, and the tension-relaxation axis was related to the durational or protensive aspect. By 1902 the first two couples exchanged places in their references to the respective attributes of sensation. Having thus exhausted all three temporal relations in this logical schema, Wundt consequently felt fortified in his tridimensional manifold for, he says, "these conditions also render it improbable that other chief directions of feeling exist."[1] But in subsequent editions this section was omitted.

[1] W. Wundt, *Outlines of Psychology* (transl. by Judd), p. 85, 1897.

Throughout the presentation Wundt was at great pains to show how intimately the simple feelings were related to sensations of all sorts. He was much impressed with Goethe's application of feeling to his theory of color and included this reference even in his much abridged *Outlines*. The figures (Figs. 5 and 6) indicate the systematic way in which he illustrated the relationship of feelings to different

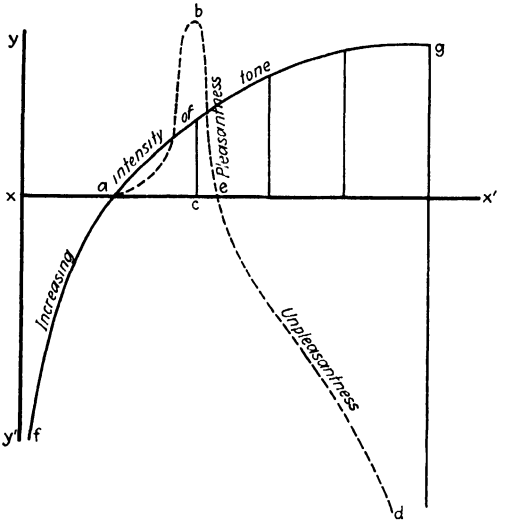


FIG. 6.—The curve for pleasantness-unpleasantness in relation to increasing intensity of sensation (Wundt). Values above the abscissa (*x*, *x'*) indicate pleasant feelings and those below indicate unpleasantness. As the physical units of intensity increase geometrically according to the Weber-Fechner law (*f*, *g*), a pleasant feeling occurs after the threshold value at *a* is reached. As the intensity of the tone increases above the liminal value, pleasantness also increases and is at its maximal value (*b*) while the tone is at moderate intensity (*c*). An increase of intensity after this point reduces the feeling of pleasantness until the place of indifference is reached (*e*). Still greater intensities of tone are accompanied by rapidly increasing feelings of unpleasantness with a maximum at *d*.

timbres of varying intensities and to the physical intensity of tone.[1] Besides, there were other feelings of the composite order which need not concern us here, when we are merely trying to envisage feeling as an elementary process.

Thus we have noticed that affection began in the Wundtian system in a sort of attributive relation to other mental processes, especially of a sensory nature, and that it remained to the end as a full-fledged

[1] T. Ziehen gives a very closely parallel treatment in his *Introduction to the Study of Physiological Psychology* (trans. by Liew and Beyer), pp. 134–148, 1899. Four controlling factors are illustrated in many sensory departments: intensity, quality, spatial arrangement, and temporal property

element. It took on, however, a manifold series of qualities orientated to six poles of a tridimensional system and figured prominently either as a simple or as a composite process in the whole of the mental life. Always it represented the subjective aspect of any of the contents that had also objective references. In terms of its various qualities, experience, as it occurred, was 'felt.' As time went on Wundt strengthened his position against attack through the work of his students and of others. But several of his students also began vigorous attacks against the position maintained by their illustrious teacher but without more effect than what Beebe-Center calls a 'stalemate.' Quoting from his excellent summary of the situation:

"In the last edition of the *Grundriss* in 1920, Wundt [in the last year of his life] was still arguing for the tridimensional theory. In the last edition of the *Textbook*, in 1926, Titchener [one year before his death] was still arguing against it."[1]

4. For and against the Tridimensional Theory.—When Wundt began to expound the systematic bearings of the theory he had two grounds for its erection: (1) his own introspective analysis, with Külpe's formal criticism in the background (*v.* p. 60), to reconsider the entire status of the 'feeling tone,' and (2) the need for a more satisfactory basis for the emotions. Titchener recognized this argument as circular, inasmuch as Wundt also demanded a multiplicity of affective qualities to meet the exigencies of a greatly varied emotional life, but Titchener admitted it as 'formally sound.'[2] Wundt particularly referred to Ziegler's treatment of the feelings of pleasantness and unpleasantness as representing an entire series of differentiated qualities (1893); to Rehmke's similar doctrine (1898); to Binswanger's protest on pathological grounds against the inadequacy of a unidimensional system (1900); to Lipps's hypothesis of the great variety of elementary feelings, especially in connection with aesthetics (1901), which theory was later transformed, however, in terms of interpreting all feelings as a striving of the self toward expression (1907); to Lehmann's atlas based upon his investigation of bodily processes (1899, 1901); to Vogt's account of a hypnotized subject who reported affective qualities in addition to the pleasantness-unpleasantness group (1901); and to Alechsieff's important confirmation of the tridimensional scheme on the basis of experimental work with the expressive method.[3] His introspective records

[1] *Op. cit.*, p. 66.

[2] E. B. Titchener, *Lectures on the Elementary Psychology of Feeling and Attention*, p. 136, 1908

[3] N. Alechsieff, Die Grundformen der Gefühle, *Psychol. Stud.*, 3, 1907, pp. 156–271.

(1) clearly distinguished the qualitative classes of all three dimensions, (2) noted the appearance of elementary processes in emotions outside sensory experiences and pleasant and unpleasant feelings as such, and (3) demonstrated that the latter classes of feeling sometimes occurred together with any one of the other four groups of feeling. He admits that feelings do not easily lend themselves to controlled experimentation because they express the entire condition of consciousness and of the whole ego. The basic forms of feeling are, nevertheless, best related to the Wundtian tridimensional manifold and are sharply contrasted through the bodily expressions of pulse and respiration as indicated by the following diagram, which was reproduced by Wundt

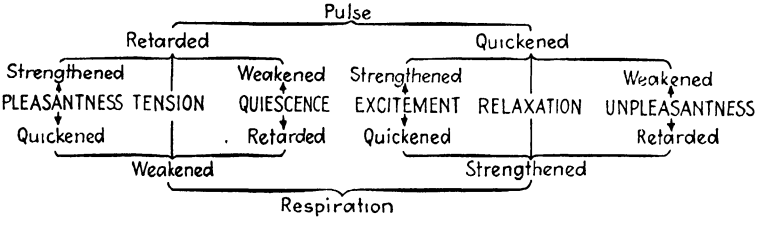


FIG. 7.—Relation of the six classes of affection in the Wundtian tridimensional theory to responses of the pulse and respiration.

in the subsequent sixth edition of the *Grundzuge* (Fig. 7). It had already appeared in connection with the pulse in the seventh revised edition of the *Grundriss* (1905).[1]

Titchener began his experimental and theoretical attack on the problem in 1899, when he published the results obtained from one observer in his laboratory who during a year's analysis of his affective experiences failed to uncover any 'affective content,' in addition to pleasantness and unpleasantness, that could not be localized accurately in some bodily organ and was therefore sensory in character.[2] The observer had run through a varied series of patriotic and other emotional experiences during the period of the Spanish-American War, had been vitally interested in the Wundtian schema, and had found some confirmative evidence of his own. But as far as the tridimensional manifold was concerned he emerged empty-handed. Titchener's theoretical criticisms centered about the uniqueness of the stated contrast between pleasantness and unpleasantness, of which he approved but which he did not find in the other two dimensions. Among the prominent attributive relations of sensory experiences, such as quality,

[1] *V.* C. H. Judd's translation, *op. cit.*, p. 96.

[2] E. B. Titchener, Zur Kritik der Wundt'schen Gefühlslehre, *Zeits. f. Psychol. und Physiol. d. Sinnesorgane*, 19, 1899, pp. 321–326.

intensity, and duration, upon which the three dimensions respectively depended, he furthermore missed the dimension which would depend on the important attribute of spatial relation; so he suggested a fourth possible dimension to complete the logical array, *i.e.*, that of expansion—rest (zero point)—contraction.

But the main experimental attack was still to come. The issue was to be settled in characteristic Titchenerian fashion by recourse to controlled experimentation. In 1902 Wundt had already admitted that the results of the expressive technique, no matter how 'objective' they might appear, are not proofs of the existence of the various affective qualities. Only direct observational evidence of an analytical sort could furnish the evidence. As Titchener's contribution to the Commemorative Volume of the *Philosophische Studien*, issued in honor of Wundt's seventieth birthday, he reported a series of experiments on observers of many types of training who were asked to react in terms of judgments of paired comparisons in regard to stimuli of different kinds. They were given all six categories of the Wundtian schema. Only the pleasantness-unpleasantness dimension led to unequivocal results. Titchener interpreted the other dimension as complexes of higher order after the manner of Stumpf's judgments of fusion. He also explained that these results surprised him (even though he had written against the theory before!) but he hoped that Wundt would accept them in the light of a scientific contribution.[1] Wundt never did! He replied that this sort of thing was to be expected from the first, since the tridimensional manifold took care of just such regularly occurring mixed groups of feelings as Titchener had aroused in his experiments. This was the inevitable result of the technique of impression.

Hayes in 1906 continued the use of this technique, however, and also came to the conclusion that the fundamental dimension was that of pleasant and unpleasantness. He started the suggestion, too, of converting at least the tension-relaxation dimension into muscular or kinaesthetic sensations and of explaining other qualities in terms of higher cognitive processes. While admitting that the number of results and of observers was so far not yet adequate to a full and final answer, he did strongly maintain that in spite of the vehement statements to the contrary at the hands of Ladd, James, Lipps, and Wundt, a pluralistic manifold of simple affective qualities, as contrasted with an unidimensional system of pleasantness and unpleasantness, was

[1] E. B. Titchener, Ein Versuch die Methode der paarweisen Vergleichung auf die verschiedene Gefühlsrichtungen anzuwenden, *Philos. Stud.*, 20, 1902, pp. 382–406.

out of the question on the basis of the very experimental technique that was more direct in evidence than the expressive techniques.

The work of Foster and Roese in 1916 furnished a sort of *coup de grâce* as far as the Cornell laboratory was concerned, for it not only gave further evidences along the same line as previous techniques of comparison had evinced, but also furnished direct introspective accounts which relegated the other two dimensions to the *sense-feeling* type of affective responses. Outside this concentrated attack, other shafts were aimed at the Wundtian system. Shepard in 1906 reported a study of the problem covering two and one-half years of experimental work with expressive techniques. Again direct observation gave evidence that strain and excitement were referable to muscular and, in some instances, to organic sensations, whereas the curves of breathing and pulse often gave results quite opposite to those of Lehmann. This had already been accomplished by Orth in 1903, whose observers consistently described all classes of feeling, save pleasantness and unpleasantness, as sensory in fundamental quality.

The doctrine also had its systematic bearings. Wundt recognized Külpe's contention that an excellent test of the primary position of the six groups of elementary feelings is their 'unrepresentability,' *i.e.*, their ability to resist ideational character. Since ideas arise from sensations, if feelings can be converted into ideas, then feelings betray their sensory reference. Külpe's observer could do this except with the pleasantness-unpleasantness dimension, which stood out uniquely as untranslatable. Wundt characteristically replied that this test was fallacious since not even pleasantness and unpleasantness could exist without accompanying sensation.[1] But Kulpe persisted with Orth and Ebbinghaus in ascribing the mooted dimensions of excitement-depression and tension-relation to complexes involving muscular and organic sensations which always accompany pleasantness and unpleasantness. Thus they did not deny the sensory accompaniment but explained away, nevertheless, the need for a tridimensional manifold. In a similar manner Jodl maintained that pleasantness and unpleasantness gained their variety in everyday life not through a variation in quality but in the diversity of other, especially cognitive elements in consciousness. This position is also subscribed to by Höffding. More recently Lindworsky has taken a similar position. He denies the plurality of even the unidimensional concept because thus far, as compared with sensation, so few qualities (only pleasantness and unpleasantness) have been actually discovered, because there is no difficulty in comparing one pleasantness with another on a qualitative equality, and because biologically we are sufficiently informed concerning the welfare of our organism through a multiplicity of impressions transferable into a qualitative diversity of sensation and a qualitative simplicity of pleasantness

[1] *Grundzüge*, 6th ed., Vol. II, p. 382.

and unpleasantness.[1] That is all we need. Further research may prove otherwise but that is the present status according to Lindworsky. While American psychologists are now almost entirely in general agreement with this view, namely, not only that the tridimensional manifold is reduced to one dimention, but also that this dimension is no longer a series of *qualities* from pleasantness to unpleasantness, we must not overlook the vigorous protest once issued by Ladd that it is:

" . . . not only . . . wholly inadequate to describe and explain the admitted data of consciousness, but even as contradictory of those data. To us this theory seems 'simplicity' itself; but simplicity, in the interests chiefly of biological and experimental psychology, 'gone entirely mad.'"[2]

Since this pronouncement was made much material has come to hand in favor of the view that there are only two basic qualities of the affective element. We can generally state that, at least for American psychology, this is the accepted view as over against the doctrine of a pluralistic unidimensional schema and, of course, as contrasted with the tridimensional schema which was maintained only by Wundt and a few other European psychologists already quoted.

Naturally there remain, however, the two other possible positions with which we started: (1) that elementary feeling is still an attribute of sensation, despite Külpe's telling arguments before noted and despite Wundt's change of opinion on this point, and (2) that elementary feeling is nonexistent as such and is completely replaceable by sensory elements. Külpe's criticism concerning the unique condition of an attribute having attributes of its own was met by Ziehen by an analogy. Oxidation in chemistry has attributes of quality and intensity while often accompanied by light of a certain quality and intensity of its own.[3] Stumpf and Titchener did not allow this argument to stand because the analogy of everyday description can not apply to psychological constructs with abstract modes of variation. We have seen also that Troland accepted the attributive doctrine, but apparently without an attempt to meet the traditional criticism. The second alternative we must now face, namely, the position of those who hold that feeling as an element is systematically nonexistent but explicable in terms of existing sensory elements.

Before we abandon this section entirely we must briefly note one other attempt to erect a manifold—this time a two-dimensional one. Cautiously, because he is still "uncertain whether Wundt's three dimensions, or some

[1] J. Lindworsky, *Experimental Psychology* (trans. by DeSilva), p. 183, 1931.

[2] G. T. Ladd, *Psychology, Descriptive and Explanatory*, p. 167, 1894.

[3] T. Ziehen, *Leitfaden der physiologischen Psychologie in* 15 *Vorlesungen*, p. 162, 1906.

still more complex account, may not prove in the end to be more acceptable," Royce proposes one dimension of pleasantness and unpleasantness (or the 'pleasure-pain' group) and another dimension of restlessness and quiescence (Wundt's 'excitement-quiescence' group). He says that the latter are easy to introspect but also "easily confounded (as I readily admit) with those aspects of sensory experience which guide us in knowing what movements we are making."[1] Pleasure "seems to accompany states in which the organism is being, so to speak, *built up*, or *prevailingly refreshed, so that its vitality is for the moment heightened. Pain* or *displeasure*, on the other hand, is such feeling as is predominant at moments when the organism *is breaking down, or is being lowered in vitality.*" The first dimension is unrelated to changes that are going on in consciousness, whereas the second group has to do with the changing or temporal aspects of our experiences, hence the reference to motor sensations. At some length he expounds these differences and also their combinations, but of course gives no experimental evidence of any sort.

To depict the present status in American psychology would be merely to list the roll call of our most widely used texts. Allport, Angell, Calkins, Gates, Murphy, Pillsbury, Seashore, Smith and Guthrie, Titchener, Warren, Woodworth, and others generally endorse the doctrine of two qualities of affective response, pleasantness and unpleasantness, or their linguistic analogues, and pay little more than historical attention to any of the complicated systems. Among the English treatises we may add to the list of general acceptances those of McDougall, Myers, Sully, and Ward. Even some of the behaviorists, like Weiss, acknowledge in their indirect language corresponding entities. Says Weiss, for example:

"Many psychologists who support the behavioristic approach to the problems of human behavior are in doubt as to where to place feeling in the psychological system. As a result pleasantness and unpleasantness is often assigned an important place in habit formation, as a selective agent in determining the stimuli to which the organism will respond. In the discussion which follows we will restrict the term feeling or affection to what is implied by the terms pleasantness or unpleasantness.

"A biosocial analysis, then, of feeling requires a description and enumeration of the biophysical and biosocial factors which are described under pleasantness-unpleasantness by the various writers."[2]

Dashiell does not deal with the elementary problem of affection as such, but discusses pleasantness and unpleasantness among other

[1] J. Royce, *Outlines of Psychology*, pp. 178 f., 1914.

[2] A. P. Weiss, *A Theoretical Basis of Human Behavior*, 2d rev. ed., pp. 415–416, 1929.

aspects of emotional responses and cites "stimuli of the noxious or avoided type" and those "of the opposite types."[1]

While Watson extensively treats the emotional life, he is even less directly concerned with the more elementary feelings or their accompanying response mechanisms.

Such a review of the textbook situation does no more than reflect a general agreement in the direction of a qualitative simplicity of the affective life. Textbooks are merely pedagogical devices largely of American origin. They hardly ever make a direct contribution to the systematic treatment of any one phase of mind. But they are indicators of a status of thinking even if they do not measure the flux. With very few exceptions, notably that of Troland, we have also seen that affection is no longer regarded merely as an attribute of other mental processes and not even as an attribute of sensation. The last position outlined at the beginning of the chapter now confronts us: what of affection as nothing more than a particular group of sensory experiences?

5. Affection as a Group of Sensory Experiences.—In the previous chapter we sketched in a preliminary fashion the view recently revived by Nafe and adopted by Titchener, though not in published form, that affection should return to its historic place among the 'felt' sensory experiences. The movement dates back at least to 1893, when Bourdon identified pleasantness with tickling. In the following year von Frey referred unpleasantness to pain and pleasantness to the avoidance of pain. Stumpf attracted even more attention when in 1907 he erected a class of affective sensations among which were tickle, itch, euphoria, sexual and other coenaesthetic sensations, corresponding to pleasantness, and pain, representing the unpleasant quality of affection. While in a general way Dunlap holds fast to elementary affects or feelings, he suggested a sensory basis when he wrote:

> "The most plausible processes as a basis for these feelings have been claimed to be the tumescence and detumescence of the erectile parts of the generative organs, but this assumption is merely tentative, and hardly yet sufficiently indicated as a working hypothesis. We should remember, however, that these processes are demonstrable in the very young baby, in whom they have not as yet become a true sex function, and that their feeling significance is unquestionably much wider than the sexual or reproductive emotions."[2]

Outside these somewhat theoretical considerations and summaries of opinion there was no consistent experimental attack on the problem

[1] J. F. Dashiell, *Fundamentals of Objective Psychology*, pp. 210, 214, 219–221, 1928.

[2] K. Dunlap, *Elements of Scientific Psychology*, p. 317, 1922.

of affection as a sensory process until about 1921, when Yokoyama concluded that, as a result of his technique of paired comparisons, from the angle of mental content pleasantness and unpleasantness are predominantly sensory.[1] Doubt had already been cast on the sheer existence of these affective elements on the basis of other experimental work, notably that of Nakashima, who, under the conditions of his research, did not get any clear-cut differentiation of affection and sensation.[2] But the problem was not pointed in that direction. Judgments of pleasantness and unpleasantness were made as immediately and directly as were, for example, the intensive attributes of the tones. The reaction times to affective judgments always averaged longer, however, than those for qualitative differences. Koch, some five years later, set up a list of a dozen criteria, gathered from the psychological literature, which should constitute the right of the affective element to exist as a different sort of entity from any other elementary process. His results were negative.[3] In essential characteristics and in the matter of attributes the affective elements were like the organic sensations which almost invariably accompanied them. In some half-dozen instances organic sensations appeared to be identical with pleasantness. In other cases the feeling became weaker while the organic sensations became clearer. The conditions for the appearance of pleasantness and unpleasantness and for the arousal of organic sensations apparently corresponded to the various aspects of organic changes. Further than this Koch would not go.[4]

Here was the situation. Nakashima had Titchener as a coexperimenter in the final section of his investigation. The last sentence in the article referred to, which ends with a reaction-time series, reads, "Whenever the observer reacted to affection he reacted to a pleasant or unpleasant cutaneous perception." The discriminatory reactions involved surfaces or objects that were hard, rough, sharp, wet, warm, and their opposites. In the meantime through the work of Becher (1915) and Cutolo (1918) Titchener[5] had

[1] M. Yokoyama, The nature of the affective judgment in the method of paired comparisons, *Amer. J. Psychol.*, 32, 1921, pp. 357–369.

[2] T. Nakashima, Contributions to the study of the affective processes, *Amer. J. Psychol.*, 20, 1909, pp. 157–193.

[3] B. Koch, Experimentelle Untersuchungen über die Mannigfaltigkeit der elementaren Gefühlsqualitäten (Doctoral thesis), Halle, Germany, 1911.

[4] We can not therefore agree with Beebe-Center in his statement (*op. cit.*, pp. 70, 77) that Koch said, "Affection is a sensory experience," or anything equivalent to this.

[5] As late as 1917 Titchener had specifically reiterated his position on affection in a critique of Stumpf's claims for the algedonic sensory group. Significant as to historical outcome is the statement: "If my present view is wrong, and if the affective

become much interested in the systematization of the cutaneous qualities, which led to the "touch pyramid" in 1920 In 1924 Nafe published his thesis.[1] He undertook to investigate the problem of the affective qualities anew and this time, as opposed to the Graz and Würzburg school, on the assumption that to be psychologically real elementary processes must be 'palpable,' *i.e.*, directly and immediately observable in introspective analysis. The test of an essential mental process in systematic psychology was, then, whether or not it could be reported in isolation under attentive analysis and in an experimental situation. How the times had changed since 1901, when we learned (see p. 61) that "*we never have a perception*," or any of the other categories (like sensation) that the systematic psychologist puts into his learned books. Another assumption in this research was that only plausible results are obtained when the experimenter, unlike previous unwitting sinners in this respect, proceeds with moderation and does not 'overwhelm' his observers with emotion: they should be *observers of feeling* and not *feelers*. This point of view is also startlingly novel because the writer was once present in a group of experimenters when Titchener stoutly defended his ability to observe analytically even when, in a personal encounter, he believed that he was threatened with death. Granted that points of view need not be steadfastly maintained through life and that a new attack is worth trying, one might nevertheless digress and indicate the pale into which a vast amount of psychological research has now been cast. To analyze the attentive state, the observer must not be 'overwhelmed' with attention; the experimenters on perception must beware that their observers do not perceive too much; the investigators on the reaction consciousness should give up the fractionation technique and be careful lest their observers become too violent actors; and the students of the sensory groups should not shower their observers with sensory stimuli, even if they are presented one at a time and under rigorous control in other regards. This 'error of transcendence' is now to be catalogued with the 'psychologist's fallacy' and the 'stimulus error' as the veritable pitfall of psychological research.

This is no place for polemics. But we shall here have to call attention to the unique position of this and some of the subsequent investigations because of the incomparable status thus created. Other previous work is therefore, with the stroke of the pen, placed beyond the reach of reference and argument. We begin *de novo*. Two methods of

processes are not to be classed apart from sensations, then I believe that they must reduce, one and all, to complexes of organic sensations. I cannot yet assure myself that such reduction is possible; but I should, in fact, prefer almost any form of thorough-going sensationalism [*sic*] to the theory which brackets together cutaneous pain (which I find to be sometimes pleasant), and the disagreeableness of asafoetida, as qualities of a single sense." *V.* E. B. Titchener, Professor Stumpf's affective psychology, *Amer. J. Psychol.*, 28, 1917, pp. 263–277.

[1] J. P. Nafe, An experimental study of the affective qualities, *Amer. J. Psychol.*, 35, 1924, pp. 507–544.

attack are left: (1) internal scrutiny of the procedure itself to find its points of obvious strength and weakness, and (2) repetition of the experiment under similar or somewhat similar conditions. The conditions can never be the same for the reason, first, that such matters as early drives and interests of experimenters vary, secondly, that laboratories have different atmospheres, traditions, and leadership, and finally, that, most of all, observers of diverse training and experience become to some extent the final arbiters (with the experimenter's version of the results) of the scientific data obtained.

But our own experience in the matter is quite to the contrary. As we shall later see, for almost a decade many of our observers have experienced, under experimental control, the most intense emotions and have been trained to note the important mental events by their scientific names—better, to live the emotion through in terms of at least some of these names- -and to report them for the protocol record immediately after the experience occurred. In fact, many of our observers facetiously remark afterwards about their "emoting all over the place." It takes training, of course, but it can be done. The training involves 'letting yourself go' during the staged emotional situation, taking it uncritically for granted as real, and assuming an objective attitude toward that experience during the report. But we must not anticipate too much a later chapter which will consider these results in more detail. Suffice for the present the expression of doubt as to the baneful effect of 'overwhelming' the observers with emotion and of making them 'feelers.'

On the contrary one might easily charge this weakly affective situation with being too weak, too indefinite, too insipid. Pleasantnesses and unpleasantnesses were not strong enough to be reported definitely as such. If analytical observation involves attentive regard toward experience plus an *Aufgabe* to report, as most authorities agree, then it is quite plausible to comment that the affective processes came in unnoticed in the shadow of other processes with which they seemed fused or identified. They did not have a fair chance. This is all the more possible since, as Titchener himself long maintained and as we have before stated, affective processes can not be scrutinized independently as 'items' of consciousness, or, in Titchener's own terms, they lack the attribute of clearness. Now deny them the advantage of intensities beyond moderate ones, and they will surely lose what little claim they may have to exist at all, *i.e.*, in the observers' protocols. Under such conditions the reports on the specific point of the affective elements would also become so vague that they would leave room for an ambiguous, or, more likely still, an indoctrinated interpretation on the part of the experimenter to whose duty it finally falls to give these results their ultimate synthesized interpretation.

What were the results? Affection is 'palpable,' *i.e.*, "it stands up under observation." It has an independent variable of intensity which is usually, under the conditions of the experiment, weak and mild. When strong enough, however, and if unpleasant in quality, it may pass over to a perceptual experience and thence over into emotion. Pleasantness is very voluminous "without limit or restraint"; unpleasantness is less so, also without limit, but constrained or contracted. Qualitatively—and this is the main contribution—affective processes are modes of pressure: "*Pleasantness is a bright pressure, and unpleasantness is a dull pressure.*" Throughout the report, nevertheless, 'P' and 'U' remain and are so designated in their traditional garb. One wonders, then, whether the 'is' is to be taken literally in the sense of 'equals' or simply as 'corresponds to.' No systematization is attempted; the traditional terms, the experimenter says, are taken "merely as labels." He himself encourages repetition of his procedure by other investigators.

The observers in Nafe's experimental series were for the most part well trained in the laboratory and at a time when the facts concerning the 'touch pyramid' were being discussed. One observer was an undergraduate taking the laboratory course with the introductory course behind her. Two were members of the instruction staff, the others were graduate students. Young, in a repetition of these experiments, distinguishes between a 'trained' and a 'practical' observer. Even though the results were 'unexpected' in the direction they took, a critic can remark on the natural development that took place in the Cornell laboratory. The first of the two main instructions was unfortunately worded when it read: "I shall give you a stimulus which is intended to arouse a moderately pleasant or a moderately unpleasant sensory experience." Why *sensory?* Obviously from the printed reports selected from the protocol one gets the impression that cutaneous and organic comparisons are made in an attempt to describe the affective experience on the basis of known experiences like tickle, itch, the actual pressures that were applied in the experiment, and from other experiences in the laboratory. In a later research on the same problem Hunt rightly notes that much of the perceptual meaning may have been actually derived from the types of stimuli that were used. A large number of the reports were couched in terms suggested by the sense modalities of taste, smell, touch, and hearing. He actually found such a confusion to exist in a preliminary series with his observers.[1] The frequent repetition of the strange phrase 'beaten up' and of the terminology connected with auditory experiments is indicative

[1] W. A. Hunt, The relation of bright and dull pressure to affectivity, *Amer. J. Psychol*, 43, 1931, p. 88.

of this.[1] The observers were searching for terms and gradually gave them perceptual meaning. Not that observers do not generally do that when left to their own devices. Probably they were doing the best they knew to describe what they 'felt' in terms of systemic complexes which were accompanying the affective impressions. It is hazardous, though, to make them partners in the general systematic treatment of the affective process, which task falls to the experimenter when he is ready for it.

This Nafe undertook to do when he erected his system of 'felt experience.' It includes all the cutaneous, kinaesthetic, organic, affective, and emotional experiences. The qualities do not become irreducible, unanalyzable, and simple but denote 'patterns,' which fact fortifies our conclusion that the observers were perceptualizing their descriptive reports in the original experiment.[2] As was stated in a previous connection, observers are usually trained to give analytic and not synthetic reports; they do not discover sensations, percepts, images, concepts, emotions, thoughts, and the whole furniture of systematic psychology. They could not be expected to use anything but the terminology that was then current in the laboratory.

In 1927 Young followed the suggestion of repeating the experiment, but Beebe-Center devotes a paragraph to the charge that this test was not fair because two of the observers maintained "anything but a psychological attitude."[3] This charge is rather strong since in the broad sense of the term 'psychological' they qualified as well as Nafe's observers. Even if the observer who was "of the behaviorist's faith" was not trained in introspective analysis, he did report imagery and organic and other sensory processes. Young stated that his negative results, except in the case of one observer, who had also reported in Nafe's experiment, are explicable in terms of indoctrination—not psychological practice in observing, but training in some one system is responsible for the type of report. There is much truth in that statement. Only the indoctrinated observer approaches the descriptions given by Nafe when he defines pleasantness as "discrete

[1] The phrase 'beaten up' is derived from James but it is also quoted in the Titchener textbook (p. 477): "beaten up together [with it] in our consciousness." Here pleasantness and unpleasantness are referred to as the subject and the interpolated 'it' stands for the sensory quality. *V.* W. James, The physical basis of emotion, *Psychol. Rev.*, 1, 1894, p. 523.

[2] J. P. Nafe, The psychology of felt experience, *Amer. J. Psychol.*, 39, 1927, pp. 367–389. *V.* also The sense of feeling, in *The Foundations of Experimental Psychology*, pp. 392–413, 1929. For an interpretation of Nafe's study by one of his observers *v.* L. B. Hoisington, Pleasantness and unpleasantness as modes of bodily experience, in *Feelings, and Emotions: the Wittenberg Symposium*, ed. by Reymert, pp. 236–246, 1928.

[3] P. T. Young, Studies in affective psychology, *Amer. J. Psychol.*, 38, 1927, pp. 157–193.

bright points of experience in the general nature of a thrill but usually much less intensive . . . vaguely localized in the upper part of the body" and unpleasantness as similar "but characteristically duller, heavy, more of the pressure type of experience . . . localized in the abdomen or in the lower part of the body." Young was not even certain that this observer actually identified the affective processes with pressures, "but there is no doubt that the reports are fairly consistent in stating that pleasantness *is like* a bright pressure and unpleasantness *is like* a dull pressure. Also pleasantness and unpleasantness are similar to visual brightnesses."[1]

The scene now turns from the University of Illinois laboratory to that of Harvard University, where in 1931 Hunt tried to test Nafe's results under somewhat more favorable conditions than those provided by Young.[2] Improvements were made in the types of stimuli used to avoid the confusion of 'pressury' meanings derived from the impressions themselves. Young's criticisms and Nafe's rejoinder were also heeded, so that observers were deliberately instructed as to Nafe's definitions of 'bright' and 'dull' pressure. Since much of the Cornell tradition is preserved in the Harvard laboratory, there would also be a more favorable 'atmosphere' toward analytical introspection in the 'psychological' (Beebe-Center) categories. The method itself was changed in that correlations were obtained between judgments made one week on the affective responses and the next alternate week on the pressure experiences called forth. Three observers were experienced graduate students and three had never done any work in psychology. This was done to test the discussion as to training *vs.* practice, since in the two previous experiments, including the original one by Nafe, a relatively unpracticed observer reported. Also on three later occasions additional groups of naïve observers were introduced to check errors that might have crept in. With the original six observers, the corrected correlation, after the application of the formula for attenuation to cancel out the factor of variability, came very close to plus unity, which is indicative of perfection. In another series obtained from eleven observers a correlation of two series, one stressing the pressure experience, the other the affective process, gave by the rank-order formula a coefficient of 0.75 ± 0.08, which is significantly indicative of a positive finding. Two of the original six observers spontaneously localized dull pressure in the region of the stomach and abdomen and bright pressure in the upper part of the chest. Five of the eleven naïve observers also made similar localizations.

[1] *Ibid.*, p. 180.

[2] *Op. cit.*, pp 87–92.

While Hunt's carefully guarded work lends support to Nafe's own research, out of three possible interpretations, Hunt chose the theoretical position that affection *is not* bright and dull pressure but that it is accompanied by bright and dull pressures. Thus we are back again on the battleground of the organic or systemic group of sensory experiences, which now are no longer dimensional qualities of feeling, but partners in the complex feeling life. We shall later see how this supports the phylogenetic theory which we shall advance in Chapter VIII. If affection, in its present varied relationship to a complex mental world that is mainly cognitive as regards outward objects and events, still retains its earliest characteristics pointed in the direction of bodily welfare, then our theory has one more leg to stand on. These light and dull pressures, which are frequently reported[1] as simple experiential elements, may be the present remnants of the more general bodily sense that must have been among the first to emerge out of the vague feelings themselves.

Converse has thrown considerable light on this problem in an experiment in which she repeated Hunt's work and kept the conditions in one of her series identical with his. There were three groups of observers: the first judged the affective value of a set of colors and then a week later the pressure values; the second group gave these judgments together at the same sitting; and the third group did likewise except that the order—affective quality, pressure quality—was reversed. Similar series were run with tones and

[1] *V.* Hunt, *op. cit.*, p. 91. All the original observers reported them. As this chapter is being written, Hunt has published a note attempting to dissolve the difficulty between the responses of pleasantness and unpleasantness, on the one hand, and of bright and dull pressure on the other. He still maintains quite rightly that they are not identical. His suggestion is that the report of affective quality may be a conditioned verbal response, behavioristically conceived and ultimately directly assigned to the stimulus-situation or to the stimulus-object arousing this pressure and occasionally forthcoming even before the sensory content is noted. This solves nothing. We are simply conveyed back to the scholastic arguments concerning nominalism and realism. For lack of space the reader is referred to an adequate discussion of this subject by E. B. Titchener (Description *vs.* statement of meaning, *Amer. J. Psychol.*, 23, 1912, pp. 165–182). Instead of cutting the Gordian knot, as the author at first blush seems to do, he is simply evading the issue by blowing both hot and cold. For all descriptive statements, including the report of bright and dull pressure, can consistently be turned over into "conditioned verbal responses." If bright and dull pressure are not equivalent to pleasantness and unpleasantness, there must be a remainder or a factor which is of the same general experiential order. In other words the equation must be formulated entirely on the basis of verbal expression or wholly on the basis of descriptive experience. Otherwise we shall have absolutely incompatible terms to deal with. *V.* W. A. Hunt, The meaning of pleasantness and unpleasantness, *Amer. J. Psychol.*, 45, 1933, pp. 345–348.

musical selections. Then, suspecting that any pair of opposites could be matched to pleasantness and unpleasantness, Converse instructed her observers to report colors as 'personal' or 'impersonal' according to definitions given to them. A high correlation was obtained between affective value and 'personal-impersonal,' equaling more than four times the probable error. But she rightly uses these results to point out that no scientific validity may be claimed for these or any similar opposites solely on their statistical correlation. Her duplication of Hunt's conditions resulted in much lower correlations than he obtained for the pressure values. All told, this brings the controversy substantially up to date and presents one of the most wholesome reflections on scientific work. Though the conclusions are obviously negatively critical, we must not fail to see that they afford a means of checking up on one of the necessary controls of psychological inquiry, namely, the mental control of the observer.[1]

Let us now pass out of the woods where we can only see the underbrush and a few of the trees at a time, and try to envisage the forest as a whole. At the beginning we asked, is the affective process an isolatable element? There were three possibilities mentioned in answer to the question: it is (1) an attribute, (2) an elementary mental process *sui generis*, or (3) identical with some other mental process or group of processes. In the face of Troland's recent position as being favorable to the first possibility, that the affective process stands in an attributive relation to other processes as "*a general property of all psychical elements and configurations*,"[2] we can not agree with this interpretation. Külpe's triple argument against such a position was never contradicted and still stands logically sound and effective. Several investigations since then have consistently reported an independent variability for the affective response that is not at all comparable with the character of other attributes. As for the third possibility, no conclusive evidence exists for an identification of the affective quality with any existing and well-recognized process. The crucial point as to whether we have identification or parallel accompaniment is left undecided by all except Nafe himself, who argues for identification. Curiously enough, though, in two separate articles, he gives the affective qualities a separate and coordinate position in his rather large group of 'felt experiences.'

While we are therefore unwilling to follow Beebe-Center[3] in his method of reaching scientific conclusions from a systematic point of

[1] E. Converse, The relation of bright and dull pressures to affectivity and the method of correlation, *Amer. J. Psychol.*, 44, 1932, pp. 740–748.

[2] L. T. Troland, *op. cit.*, Vol. III, pp. 225–226.

[3] *Op. cit.*, p. 77.

view by the 'counting of noses,' we make the claim that the historically well-established position of the affective response as an elementary mental process, though mightily assailed and somewhat battered, still stands untaken. If its right to exist is questioned, then so have the rights of other categories, like those of sensation, instinct, reflex, and thought, been questioned. In science as elsewhere we should not be called upon to give up what we have, before we are given something better. Besides, let us reiterate: systematization is not done, or rather should not be done, by observers, but by experimenters who have the perspective not only of their own experiments but of all experiments which have a bearing on the subject under consideration. Our own answer is that the affective element is incomparable in several respects with other later developing mental processes. As primordial, undifferentiated consciousness, it differs as the egg from the chicken or as the acorn from the oak. But just as there may be eggs while at the same time there are chickens in a given area, or acorns about the oak trees, so there are affective experiences at the same time that more lately developed processes are in the mental life. The difficulties attending their observation and analysis are difficulties of the same order as were those which attended the early stages of child psychology. We were always then either trying to interpret children as little men and women, 'vest-pocket' editions of adulthood, or else identifying them with the lower animals and treating them as little 'pups' and 'kittens.' We now regard them more or less as *sui generis*.

6. Mixed Feelings.—There are several minor matters which we must consider briefly. For some time there has been a considerable amount of discussion as to whether pleasantness and unpleasantness can exist at the same time, *i.e.*, whether we have 'mixed feelings' and if so, what explanation is there to offer. By way of systematic presentation Külpe had said that he was uncertain on the question, while Ebbinghaus, Wundt, and Sully allowed this possibility to occur in their generalizations. While we might multiply references on this point all the way back to Socrates and while we might get as many divergent opinions from these historic and theoretical sources, the experimental approaches to the problem will be found more fruitful. Orth, a pupil of Külpe's, in 1903, Hayes, one of Titchener's pupils, in 1905, and Alechsieff, at the Wundtian laboratory, in 1907, all obtained negative results in a direct attack on the problem. There were no mixed feelings, only rapidly alternating feelings. In 1906 Johnston at Harvard found the first experimental evidence in favor of the coexistence of pleasantness and unpleasantness. This was followed from 1909 to 1916 by four further studies by Nakashima, Koch, Kellogg,

and Henning in favor of this situation. In 1918 Wohlgemuth secured results in favor of mixed feelings.

We could go into these experiments in detail and cite the references, but the student is referred to Beebe-Center, where the subject is extensively treated and the work fairly evaluated.[1] The answers so much depend on the definitions of the affective processes which we have already gone over and on theoretical distinctions in psychology itself that a long recital of experimental conditions and data is not necessary. The upshot seems to be that (1) pleasantness and unpleasantness as qualities may appear in oscillation or in rapid sequence under certain conditions, (2) meaningful objects or circumstances or events which are separately pleasant and unpleasant may be attended to during the same conscious span of the present moment. This is chiefly the interpretation of Young,[2] who has had controversial arguments on the matter with Wohlgemuth.[3] The main difficulty seems to lie in the direction of the ambiguity of verbal descriptions in the reports. Young says, "Our protocols contain a good many ambiguous reports which, if taken at their face value, might possibly be interpreted as mixed feelings." But even the report of a mixed feeling by an observer does not imply to Young that pleasantness and unpleasantness coexist. He therefore quite correctly distinguishes between the *meaning* of pleasantness in objects and events and the *experience* of the pleasant quality itself. Although a number of objects or events, to which affective meanings are attached, can therefore give rise to mixed feelings of pleasantness and unpleasantness at the same time, the qualities of pleasantness and unpleasantness can not be experienced together. He enumerates four types of normal experiences which resemble mixed feeling.

1. Rapid alternations of pleasantness and unpleasantness. One observer remarked that while she was inhaling an odor the experience was unpleasant, when it was exhaled the experience was pleasant. Sometimes the alternation was even faster than the rate of respiration and therefore based on other grounds.

2. Affective doubt expressed in, as an attitude, 'I don't know whether I like it or not.' While intellectual doubt was always found to be unpleasant, affective or taste doubt may be both pleasant and unpleasant. Certain phases of an odor may be pleasant, other aspects, especially when pro-

[1] *Op. cit.*, pp. 78–90.

[2] P. T. Young, An experimental study of mixed feelings, *Amer. J. Psychol.*, 29, 1918, pp. 237–271.

[3] A. Wohlgemuth, The coexistence and localization of feeling, *Brit. J. Psychol.*, 16, 1925, pp. 116–122.

longed, may be unpleasant. The odor of pine-needles, through its associated meaning of pine trees may be pleasant but its pungency, reminiscent of turpentine, may be unpleasant. The taste of saccharine is sometimes likewise described as "sickening sweet."

3. A current mood of one sort may be briefly interrupted by an affective experience of an opposite quality. While pleasantly engaged in a fascinating mystery story, there may be a sudden nasty detail in the narrative which is "like punching a hole through it." Even an unpleasant episode, like a quarrel, engendering an unpleasant mood may be interrupted by a disparaging witticism whose cleverness may cast a pleasant ray of sunshine through the gloom.

4. The cognition of an object which has one type of affective meaning, *e.g.*, pleasantness, while the actual experience is an opposite affective quality. In case of an individual who is fond of limburger cheese it might occur that the usual meaning or significance of a foul odor is coupled with an agreeable experience of eating the cheese. He might very well say, as did one of Young's observers, "I like that despite the fact that I know I'm not supposed to." An illustration of this type is to be found in a discussion of humor by Maier. He says, "If we ask people to tell humorous stories about their past adventures, we often hear tales of incidents which at the time of their happening were tragic. Events of our childhood, and even last year's tragedies, are suddenly funny to us as we tell them to evoke laughter in others. Time has removed the subjective factors and we are therefore able to see the situation objectively."[1]

It is clear that Wohlgemuth has not fully grasped one of Young's important distinctions. 'Laboratory atmosphere,' dialectic, and preponderant theory are not in the picture; nor are systematic distinctions mere logomachy. In reply to Young's criticism that when an observer reports the object to be pleasant, there is full guarantee that the *meaning of pleasantness* was attached to the object, but not that pleasantness was felt, Wohlgemuth answers with a rhetoric question, "How can the *meaning of pleasantness* be attached to the object, unless the perception of the object had previously given rise to the experience of pleasure? How can the *knowledge* be acquired without the occurrence of the *affective* experience."[2] To these questions, there is the obvious answer: the *knowledge* may have its origin at the time when the object was pleasant, but the recurrence of that knowledge, as illustrated above, may yet give rise at the present time to anything but a pleasant experience. An estimable young lady may have been infatuated with a prepossessing young man—on the whole a

[1] N. R. F. Maier, A *Gestalt* theory of humour, *Brit. J. Psychol.*, 23, 1932, Pt. 1, pp. 69–74.

[2] *Op. cit.*, p. 120.

pleasant experience at the time and in memory. Since then she has discovered that he is either a philanderer or a married man. When she sees him again, he still has his attractiveness, but the present experience no longer tallies with the former in affective response.

7. Other Aspects of the Affective Element.—It is not necessary here to review some of the peculiarities of the affections which we have already stressed in this chapter and in the previous one. Suffice it for the present to recall that the attensive attribute, or its equivalent descriptive characteristic, was one of the marked differentia between it and other mental processes. Pleasantness or unpleasantness, when attended to, disappears as such. Titchener therefore claimed that affections lack the attensive attribute, Jodl declared them to be subjective, and Külpe said that they grow weaker under attentive regard. Most authorities agree on this point: when there is any divergence of opinion it usually results from the distinction (1) between the affectively toned object which is cognized and 'held' in attention, while the affective quality is only incidentally noted, as in the technique of impression later to be discussed, and (2) between the affective element itself and the sensory processes which accompany it, as in the case of the 'felt experience of tickle and pain.' Sometimes it is even admitted that unanalytical attention may be directed to the quality of pleasantness and unpleasantness without destroying it. Sully takes issue on the first distinction, enumerated above, with Ward, who upholds the point made, *i.e.*, that attention may even intensify the presentation or percept, but not the feeling. Wohlgemuth put the problem to a specific experimental test. One observer could not assume the attitude of analytical attention to the affective qualities and the other found that attention destroyed the algedonic tone. In general, while the experimental evidence is not sufficiently impressive, most authorities will fairly uniformly agree that the affective element can not be itemized out of the mental life, that analytical attention destroys it, and that it more normally is found as a tone suffused over other processes or the entire span of consciousness.

Another question has to do with the matter of localization and its supposed spatial dimension. To some extent the questions are involved in items already discussed. For example, we found that Nafe's 'bright' and 'dull' pressures, the equivalents of affective qualities, were localized in the upper and lower parts of the trunk, respectively. In several other cases, like that of Young, localization refers to the sensory correlates of feeling. This construction would certainly apply to sense-feelings, like hunger, thirst, and Boring's 'ice-cream' sensations. The outcome is generally negative when it refers to the qualities of

affection when they are attributes of the elementary feeling. Pleasantness and unpleasantness have no spatial orientation in the body when they belong to the affective element, not to a sensory component. The same interpretation of experimental results holds for the spatial attribute of volume or extension.

8. Summary.—We have been on a long winding road and much of the way it has been uphill, with our vision obscured at times. But we are gradually getting to higher ground. Purposely we started out with a discussion of how elements in general are constructed for any systematic science. The affective element fills the requirements of being both a convenient and conventional abstraction and a focus of greatest concreteness and significance with less definite meanings in the periphery. By sketching in the historical development of the Wundtian system we saw how this elementary feeling first appeared as an attribute of other mental processes and of consciousness as a whole. Later it emerged as a full-fledged elementary process, but varying widely from the rest in that it had a multitude of qualities which demanded a tridimensional schema for its presentation. In this schema it might move in the course of time so that it became related to one or more of the bipolar axes of pleasantness-unpleasantness, tension-relaxation, and excitement-quiescence. These main pairs of qualities were referred by Wundt to attributive phases of sensation and also to their temporal status as to past, present, and future. But most significant was the definite way in which affections were connected with different kinds and intensities of sensory experiences.

This schema immediately started a controversy, even as the attributive explanation of it had brought out Külpe's three telling arguments, and earnest experimental work began. Affections were especially investigated in connection with bodily processes of pulse and breathing, but also the technique of impression was brought into frequent use. The final outcome was that while Wundt never recanted, most psychologists found that pleasantness and unpleasantness were the only qualitative differences and that they did not even represent a dimension with various other qualities between the poles, as in the case of the grays between white and black. The other two dimensions were interpreted in terms of sense-feelings of the organic and kinaesthetic type.

Thus the matter of the qualities fairly generally stands today, especially in American and British psychology. But immediately another problem arises: Is affection a distinct elementary process or is it convertible into other existing processes? The economy of thought would demand the simplest adequate arrangement, provided it squares with the facts. A few writers, like Troland, despite all that has gone

before still would make affection an attribute of other processes. A persistent endeavor, however, has appeared in the direction of identifying the affective element with 'felt' experiences. We have waded through the evidence *pro* and *con*. Several possibilities were created. Nafe consistently defended his position that the affective qualities are identical with bright and dull pressures. At the same time he lists the affective processes *among* other 'felt' experiences. The last study by Hunt took another possibility that the affective processes were *accompanied by* bright and dull pressures. This is the view which seems most likely to us. We maintain that if the assumption of a genetic growth of consciousness is plausible and if the affective process was primordial there will always be a systematic difficulty of comparing this elementary process with others that came after it, or rather emerged from it, and became by that manner of growth different in texture and nature from the one that was primordial. At the same time the primordial type still persists, just as primitive people exist sometimes among highly civilized ones and are for that reason often very much misunderstood and mistreated. While the affective process on account of this rudimentary character is therefore, in a sense, incomparable, point by point, with other elementary processes that have successively emerged in the face of an ever increasing complexity of the environment and especially in terms of an inner process of elaboration, it still meets the specifications of systematic psychology for an element. It has definite qualitative characteristics and a sufficient number of quantitative attributes, those of intensity and duration, to give it status as an elementary process. We shall see, furthermore, that it furnishes a satisfactory basis for the more complex forms of the emotional life for which it forms the genetic basis.

Another argument that we should not overlook is the present defensive position of the affective process. While much more experimental work needs to be and will be done, all the attacks thus far directed against it have been unavailing. Some have tried to make it an attribute, serving other later established and more potent processes, some have tried to do away with it altogether, either as an elusive and a scientifically untrustworthy meaning or as a group of sensory experiences. But it is still among us. The writer would like to emphasize the fact, here as before, that a few new experiments can not in and by themselves alone do away with a systematic position. They can not at one fell blow sweep away what was in the first place a systematic construct. Observers know these constructs not from their analyzed experiences directly, but through their earlier training in psychology or from their experimenter's instructions. Anyone who, as the writer

has done has tried to get from naïve observers, unversed in the terminology of psychology, a 'phenomenal' descript on of tones, let us say, finds that they go back to whatever little they may have picked up about tones, or else the result is the veriest hodgepodge and almost entirely undecipherable. In this sense, then, newer investigations must be considered confluent with what has gone before. As the decades pass, these fundamental tenets of the science will then be modified when scientific progress occurs. Sudden discoveries have been and will be made. But in psychology the scientist, not the observer, makes them—unless, indeed, on some rare occasions the psychological scientist is also the observer.

Other points which we discussed were mixed feelings and localization of affective processes and their extensive attribute. Our conclusion was that, if merely the pleasant or unpleasant quality was meant, *i.e.*, the experience of pleasantness or unpleasantness without immediate reference to an object or situation, then pleasantness and unpleasantness could not be consciously coexistent. They might alternate, even quite rapidly, or one could interrupt the other, or there could be affective doubt, ranging from indifference to a rather marked uncertainty of judgment, or an object or situation which had an affective *meaning* could be attended to while an affective *quality* of the opposite sort was also being experienced. In these senses, mixed feelings could be experienced. In some ways the answer here is the same as in the case of red and blue, when retinal rivalry takes in binocular vision. But then thus far no mixture has been reported. It would be an interesting experiment to discover whether an alternation like that of retinal rivalry would ultimately merge into a resultant mood, let us say, a mood of uncertainty or doubt. Certain it is that fusion, like the fusion of tones in a chord, has not yet been found. The questions of localization and of extensity or voluminosity are negatively answered unless the affections have been literally converted into sensory equivalents or reference is made to sensory accompaniments. As elementary feelings they can not be localized and they are not extended.

Review Questions

1. What are the criteria of an *elementary* process?
2. Trace the development of Wundt's position in regard to the affective process
3. What facts can be arrayed against the tridimensional theory of affective quality?
4. Outline the controversy concerning the translation of affective qualities into sensory terms.
5. To what extent may *bona fide* emotions be aroused under laboratory control?
6. Specify Young's criticisms of the Nafe position.

7. What tendencies are manifest in the interpretation of the possibility of so-called mixed feelings?

8. Can affective qualities be localized? What may be localized?

9. To what phase of an affective experience may attention be directed?

10. On a genetic basis why is it not possible to analyze the affective processes in the same manner as other elementary processes?

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CHAPTER V

THE CLASSIFICATION OF EMOTION

The love, which we feel for our friends, is different from that, which we feel for a parent or brother; and both are different from that, which we feel for our country. But it is impossible to convey in words the precise distinctions, which may justly be thought to exist both in kind and degree. Such an attempt would only involve the subject in greater confusion.

T. C. Upham, *Elements of Mental Philosophy.*

1. The Need for Classification.—Hardly enough experimental material has accumulated to ensure an adequate scientific classification of emotion. Many decades hence, this statement may seem historic and obsolete. The only justification for making an attempt to enumerate and to evaluate what classifications have appeared from time to time lies in the gesture of lifting a finger of warning as to the future. Never again must such classifications be set down in psychological texts until more experimental facts are available! We have to know what has been tried before so that we may not fall into the same error again. Besides, new ideas grow out of old ones: even leads for experimental research have often come out of historical suggestions, if for no other reason than to prove or disprove what previous writers have claimed to be true on the basis of their uncontrolled observations. In all fairness to these, often brilliant, thinkers we must remind ourselves that such classifications summarize the many generalizations which they made.

Especially do we find a real need for some preliminary summaries of the emotional life because of the great diversity of the emotional experiences of everyday life. The above quotation is an instance, but there are obviously still other 'loves,' like neighborly love, Platonic love, the love of lovers, love for one's enemy, self-love, love of achievement, love of home, and so on *ad infinitum* or *ad nauseam.* Then we might take some other emotion like fear and parade forth an equally long list. In our laboratory studies, as we shall later have occasion to see, we introspectively distinguished several different kinds of fear and of surprise. It is an interesting and instructive exercise for any student who believes himself to be solely a rational being to note down consecutively the various emotions which he experiences during any

given day. The list will likely be astounding and will often test his descriptive vocabulary.

In mentioning vocabulary we must submit that until our terminology in the affective and emotional life becomes more standardized classification can be of little avail. Dunlap, one of the speakers at the Wittenberg Symposium on the feelings and the emotions, facetiously remarked in connection with his chosen title, "Emotion as a Dynamic Background":

"In my title there are three words the meanings of which are uncertain. These words are: *emotion*, *background*, and *dynamic*. No one can predict what anyone will mean by these words, until they have been scrupulously defined. Even with the most careful definition and explanation I could give, many persons would probably understand me to use them in senses radically different from those of my definition. It would be better in some ways if I made substitutions for these terms, using the common symbols for unknown quantities, so that the title should read "X as a Y Z." But even then, there would come a moment at which the listener would say: "Oh, yes, by X you mean an emotion." And then he would proceed to refer everything I might say about X to an emotion as he understands the term, regardless of what I mean by it."[1]

In short our terminology *in re* the affective life is still in a chaotic, or shall we say, a fluent condition. Satisfactory classifications can therefore not be in order until the basic facts are at hand. But as we noted above they can record the work of the past and in that respect serve as a base of departure even if the entire principle of classification must soon be revised. These are handicaps to be overcome, but not insuperable obstacles. Warren met a similar situation in connection with his recently published *Dictionary of Psychology and Cognate Sciences*. His reaction is worth quoting:

"In preparing our definitions we have been struck by the extreme difficulty of finding a good technical meaning for many of the terms in common psychological use. This is particularly true in the field of emotion. There are hosts of these terms in popular use, which presumably have distinguishable shades of meaning—and which would seem to be fair grist for the psychologist's mill. Yet in many cases the attempt to define them in technical language has proved a failure, and they have been discarded as 'merely popular' or 'self-explanatory.' The fault lies not altogether with the Editor and his associates. In many cases it means that psychology has not yet reached a stage sufficiently advanced to give a technical meaning to these terms. We have cited the field of emotion merely as an example.

[1] K. Dunlap, Emotion as a dynamic background, *Feelings and Emotions: the Wittenberg Symposium* (ed. by Reymert), p. 150, 1928.

The same criticism applies to terms in other fields as well. It is our hope that these omissions and the obvious imperfection of many of the definitions may direct research toward widening our knowledge of the processes and phenomena which these terms imply."[1]

It is with a similar hope that we discuss some of the chief classificatory systems which have molded psychological thinking. Before giving definite instances and principles we shall have to get a brief historical perspective.

2. Gradual Emergence of Classificatory Schemes.—Without repeating any of the materials brought forward in our historical chapter, we may say that the beginning of some sort of classification began when Tetens (see p. 44) proposed his tripartite envisagement of the human mind. But Wreschner makes it quite clear that the present-day, especially the British, view of this problem did not really begin until Kant's day.[2] Tetens made his 'feelings' broad enough to include sensations. Today the term 'thinking' is replaced by the cognitive processes which came to include the "senses and the intellect."[3] But Tetens characteristically for that day defined 'feeling': first the mind has the faculty of allowing itself to be modified, a sensitivity, receptivity, or modifiability; then a faculty of becoming aware of changes thus produced in it: both together constitute feeling." There is no difference here between sensitivity, or readiness to receive sensory impressions, and feeling. "Merely receptivity and feeling are involved when one who is cognizant of the finer beauties of a poem, a statue, or a painting, is moved." Kant was really the first to separate the feelings proper from the sensory phenomena and thus became the sponsor of our current tripartite system.

In our historical perspective (p. 42) we have noticed that the first thoroughgoing classification was really made by Spinoza in the seventeenth century. Calkins acknowledges its keen adequacy when she states that her own classification owes much to it.[4] All affections were classed by him, however, as confused ideas because he has "shown that

[1] H. C. Warren, *Dictionary of Psychology and Cognate Sciences*, Introductory, 1934.

[2] A. Wreschner, *Das Gefuhl*, p. 9, 1931.

[3] We have referred before to E. W. Scripture's *Thinking, Feeling, Doing*, published in 1895, probably the last appearance of this division in psychology. Bain, who in 1875 founded the influential British periodical, *Mind*, is probably also responsible for initiating the prevalent practice in Great Britain through the publication in 1855 of his *The Senses and the Intellect* and in 1859 of his *The Emotions and the Will* Baldwin's American systematic treatment was similarly divided in 1890–1891.

[4] *A First Book in Psychology*, 4th rev. ed., p. 373, 1914.

the mind only suffers in so far as it has confused or inadequate ideas."[1] Nevertheless some forty-eight emotions were specifically described with considerable insight. In the preceding century Descartes had already done good work in describing the emotional experiences.[2] He is generally credited with making the first distinction between sense-feelings, which refer to our own bodies, and emotions, which bear a cognitive reference to objects and situations outside us. He also anticipated to a very definite extent the much later James-Lange theory, just as Malebranche about a century later more specifically anticipated the Lange vasomotor changes. But generally, at least until the end of the eighteenth century and even often in the nineteenth century, sensory experiences were not generally demarcated from feelings. To Kant belongs the credit of very definitely making this distinction, thus improving upon the Tetens division by placing the sensations with the cognitive processes, where they have remained ever since, and by giving the feelings a separate category. He explicitly states that feelings of pleasantness and unpleasantness must not be confused with the organic sensations and that sensory agreeableness is not pleasure. But the faculties prevailed in Kantian psychology and it remained for the Herbartians to give us a more satisfactory classification.

With the Herbartians a radical departure was made in the attitude toward the threefold division of mind.[3] No longer were 'faculties' tolerated. There was the express stipulation that the three parts were separately discussed for scientific reasons only and that actually they were mutually involved and interactive. They were all founded on the primary element, the presentation or idea which occupied the place in the Herbartian system that the monad had occupied in the Leibnizian doctrine. The cognitive, emotional, and volitional phases were, then, to be considered as secondary phenomena. Feelings arose as the result of the mutual interactions of ideas in their dynamic struggle above and below the threshold of consciousness. There were two opposite tendencies, those of inhibition and conflict, and those of facilitation and harmony. Feelings are thus defined: "The immediate awareness of inhibition or facilitation among the ideas present at any moment in consciousness." Waitz among the followers of Herbart came very close to making feelings independent entities because he

[1] R. Willis, *Benedict de Spinoza, His Life, Correspondence, and Ethics*, p. 558, 1870.

[2] D. Irons, Descartes and Modern Theories of Emotion, *Philos. Rev.*, 4, 1895, pp. 291–302.

[3] *V.* A. Bain, *The Emotions and the Will*, 3d ed., p. 596. 1888.

said that they were not modified impressions or reducible to sensations. Wundt was very much influenced by the Herbartians, though never a member of this flourishing school, of course. It was he who finally divorced the affective experience systematically, as we have seen, from other elementary processes.

3. Some Typical Classifications of Feeling and Emotion.—A mere enumeration of classificatory schemes would be to no essential purpose. It is instructive, however, to peruse a few typical examples to see what has been done to date without aiming to be at all exhaustive of the material. Most illuminating are the various principles of classification that appear from time to time and also the manner in which the classifications reflect the type of psychological system current at the time. We may begin with a fairly elaborate scheme proposed by Nahlowsky, one of the most influential of the early Herbartians.[1]

I. Feeling Proper
  A. Formal
    1. General, more elementary
      a Oppression—relief
      b. Exertion—ease
      c. Seeking—finding
      d. Success—defeat
      e. Harmony—contrast
      f Power—weakness
    2. Special, more complicated
      a. Expectation
      b. Hope, apprehension, astonishment
      c. Doubt
      d. Tedium
      e. Entertainment, diversion, recreation
  B. Qualitative
    1 Lower feelings attached to sensory processes
      Pleasures—pains of color and sound
    2. Higher feelings attached to intellectual processes
      a. Truth—probability
      b. Aesthetic
      c. Moral
      d. Religious
II. Complex Emotional States
  A Involving conation (desire or aversion)
    1. Sympathy
    2. Love
  B. Resting on an organic foundation
    1. Disposition, mood, frame of mind, *e.g.*, hilarity
    2. Affections
      a. Heightened or arrested intellectual activity (Drobisch)

[1] *Op. cit.*, pp 50–51, 1862.

b. Agreeableness or disagreeableness
c. Leading to desire or aversion (Kant's sthenic or asthenic)
d. Heightened or depressed bodily tone
e. Increase or decrease in vitality (Nahlowsky)
(1) Active, or 'plus' side
Pleasurable surprise, sudden mirth, jollity, frolicsomeness, joyful transport, rapture, courage, rage, vexation, admiration, enthusiasm, ecstasy
(2) Helpless amazement, embarrassment, perplexity, painful surprise, fits of sorrow and sadness, apprehension, depression, faintheartedness, shame, fear, anguish, terror, horror, repentance, despair

We see in this classification the characteristics of the Herbartian system at work. While there is some attempt to arrange the feelings and emotions on the basis of simplicity and complexity, an interweaving of dynamic conditions, especially those of facilitation and inhibition of the free flow of ideas and of other corresponding bodily processes, also occurs. From internal evidence no doubt exists that the influence was felt even outside Herbartian circles. Bain gives the classification in some detail. He says that "Herbart and his followers are of more importance than Kant in all that regards Psychology, and especially the analysis and classification of the Feelings."[1] Wundt himself acknowledged that Herbart took a great step in advance because he attempted to make an elementary analysis combined with a purely psychological attitude, even if he was beset by metaphysical presumptions and an intellectual type of interpretation. To Herbart's followers he also grants credit for developing the doctrine of emotional expression suggested by Kant.[2] "In contrast to this scholasticism," he says, "the Herbartian theory still remains, as a matter of fact, a masterpiece of psychological observational skill."

In the Wundtian schema we have a somewhat complicated system, starting with the simple feelings with which we have already dealt in the previous chapter and moving on through the composite feelings to the emotions. He defines composite feelings as intensive states of unitary character in which single simple affective components are to be recognized. Some of these relatively permanent combinations are known as moods. These composite feelings may be resolved into *component feelings* and into a *resultant feeling*. The component feelings are always simple sense-feelings. Another way of stating their complexity is to say that these composite feelings may be analyzed into a *total feeling* and into *partial feelings*, which latter in turn may be classi-

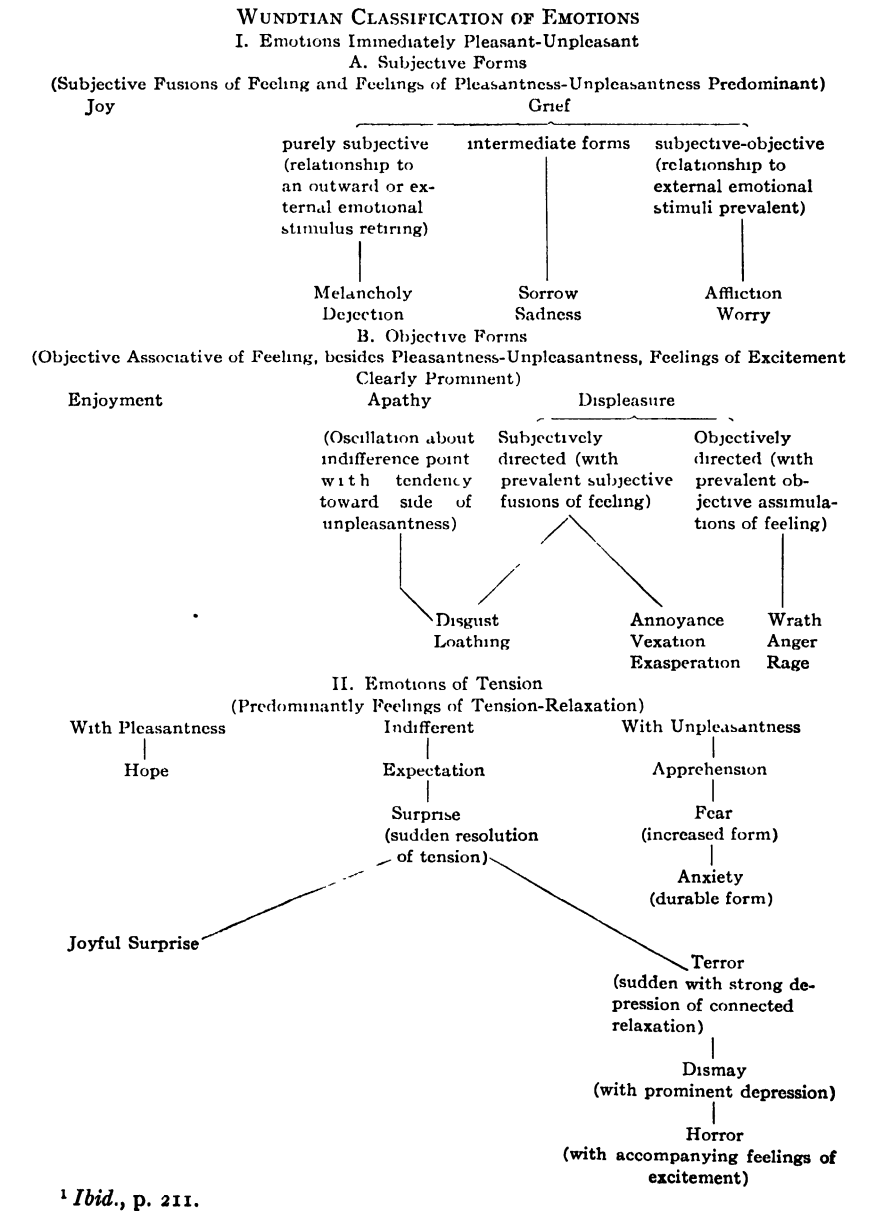
[1] A. Bain, *The Emotions and the Will*, p. 596, 1888.
[2] *Grundzuge*, 6th ed., Vol. III, pp. 217–218.

fied as to whether they belong to the category of simple sense-feelings (partial feelings of the first order) or of composite feelings (partial feelings of the second or of higher orders). The common chord in C major may give, for example, a total feeling of harmony, whereas the separate notes may have simple sense-feelings attached. But partial feelings of the second order may arise when the consonant qualities of C and E, E and G, and C and G are also regarded, depending in their total effect upon the intensity of feeling attached to these several combinations. There are also temporal sequences to be taken into account when progressions of chords are involved. Complications are further developed when these feelings are connected with sensory qualities of different orders, the simplest being affiliated with touch, smell, and taste, and the higher complexities with auditory and visual ideas which give rise to elementary aesthetic feelings.

When such a series of composite feelings is considered as a momentary affective state in which this sequence is combined into a relatively unitary whole, separate from other preceding and succeeding states, then we have an *emotion*. There is no sharp line of demarcation, but every feeling of greater intensity gradually becomes an emotion. These may be classified on the basis of three principles: (1) the quality of the feelings which make the emotion, (2) the relative intensity of these feelings, and (3) the temporal pattern of their occurrence and their temporal changes. The first criterion follows the well-known three-dimensional scheme, although even more so than the simpler feelings, emotions present intricately mixed qualitative patterns. The pleasant-unpleasant forms of emotion have been particularly stressed through names supplied by language. These qualitative descriptions are subjective in character. Names are also given to the emotions through objective or outward references involved in the experience such as delight and displeasure, with its subforms of annoyance, resentment, anger, and rage. Further qualitative designations indicate a reference to future conditions, such as hope and fear, with its subclasses of worry and anxiety. Wundt comments on the fact that there are more names for unpleasant emotions because they may actually be more numerous and because unpleasant experiences attract more attention. The factor of intensity subdivides itself naturally into weak and strong with their intermediate gradients. But the form of temporal occurrence is still more important in a classificatory scheme. Surprise, fright, disappointment, and rage belong to the first type of *sudden, irruptive* emotions; anxiety, doubt, care, joy, anger, worry, and mournfulness are instances of the second class of gradually arising emotions; and finally any of the second class may come on

occasion also into the third or intermittent class, in which there is a periodical ebb and flow in their intensity.

The principles of classification are illustrated in detail in the following outline:[1]



[1] *Ibid.*, p. 211.

This schematic outline comes perhaps nearest to being a truly psychological classification. It is heavily weighted, of course, by the tridimensional doctrine whose adequacy Wundt intends thereby to illustrate and it is handicapped by the translation into English terms, because, as he himself notes, the names of the emotions in the German language are significant themselves as indicative of underlying attitudes and differentiae. In several instances the inherent meaning of the German equivalents is hard even to approximate. But it is important to note that, outside of systematic requirements, logical and biological criteria are altogether avoided or at least minimized in effect. The scheme therefore represents a distinct step in advance, paralleled only, perhaps, by the outline offered by Calkins as representative of another systematic point of view, that of 'self' psychology.

In the Calkinsian presentation we know, of course, that both structural and functional points of view are followed throughout, but there is a well-integrated pattern of the conscious self woven into the scheme.

"Consciousness . . . always is a somebody-being-conscious." "I immediately experience myself as (1) relatively persistent—in other words, I am in some sense the same as my childhood self; as (2) complex—I am a perceiving, remembering, feeling, willing self; as (3) a unique, an irreplaceable self—I am closely like father, brother, or friend, but I am, after all, only myself: there is only one of me. I experience myself (4) as related to (or, conscious of) objects either personal or impersonal. For example, I am fond of my mother (relation to a personal object) and I am tasting an orange (relation to an impersonal object)."[1]

Keeping this in mind and interpreting the following classification in the terms of this related 'self,' we can see again that the scheme succeeds in following mainly psychological rather than logical or biological principles:

CALKINS' CLASSIFICATION OF THE EMOTIONS[2]

SOCIAL EMOTIONS (WITH PERSONAL OBJECTS)

I. Egoistic, unsympathetic emotions
  A. With other self as object
    1. Happy (that is, pleasant) emotions
      a. Without valuation of other self
        Happiness, realized as due to other self — Liking
      b. With valuation
        Happiness, realized as due to other self
        Who is
        (1) Stronger than oneself — Reverence

[1] M. W. Calkins, *A First Book in Psychology*, 4th rev. ed., pp. 1, 3, 1914.
[2] *Ibid.*, pp. 185–186.

(2) Equal to oneself	Love (?), Friendship (?)
(3) Weaker than oneself	Tenderness (?)
2. Unhappy (that is, unpleasant) emotions	
a. Without valuation	
Unhappiness, realized as due to other self	Dislike
b. With valuation	
Unhappiness, realized as due to others	
Who are	
(1) Stronger than oneself	Terror
(2) Equal to oneself	Hate
(3) Weaker than oneself	Scorn
B With myself as valued object	
1 As valued by myself	
a Happiness in myself, regarded as worthy	Pride
b. Unhappiness in myself, regarded as unworthy	Humility
2. As valued by others	
a. Happiness in being admired	Vanity
b. Unhappiness in being scorned	Shame
II. Altruistic, or Sympathetic, Emotions	
A. Homogeneous	
1. Happiness through shared happiness	*Mitfreude*
2. Unhappiness through shared unhappiness	Pity
B. Heterogeneous, or mixed	
1. Happiness through another's unhappiness	Malice
2. Unhappiness through another's happiness	Envy

NON-SOCIAL EMOTIONS (WITH IMPERSONAL OBJECTS)

I. Egoistic	
	Like
A. Sensational	Dislike
	Ennui
B. Relational	Enjoyment of the familiar, *etc*
II. Altruistic (absorbing)	
A. Sensational	Aesthetic pleasure
B. Relational	Logical pleasure
	Sense of humor, *etc.*

These 'basal' emotions are discussed at some length in the text. It soon becomes apparent that at every turn these emotions have an egoistic reference. Like and dislike, and the 'relational' emotions as well, lay "special stress on myself and my condition"; but even those feelings that are aesthetic and impersonal involve a consciousness of self. "Absorption in the beautiful is never a loss of self . . . but . . . there is the beauty of this or that sense-thing, which one feels, accepts, and receives, widening thus the confines of one's personality."[1] The illuminating discussion of Höffding to whom Calkins makes specific

[1] *Ibid.*, pp. 200–201.

acknowledgment also contains many references to the self but does not readily fall into a tabular arrangement.[1]

A somewhat similar systematization occurs at the end of Lehmann's scholarly treatise, where he grouped all feelings under six rubrics depending upon the various relationships of the self to the environment. They follow:[2]

I. The self takes an active attitude toward the environment:
The *fiat* feelings (feelings of accomplishment or of lack of it)

II. The self regards itself as an effective member of the world:
The self-feelings (confidence, pride, virtue, shame, *etc*)

III. The self is the object of such impressions from the environment which are immediately apprehended as hindering or helping its existence:
The autopathic or egoistic feelings (hunger, thirst, joy, sorrow, impatience, anger, jealousy, *etc.*)

IV. The self is related to the environment merely as an observer:
The aesthetic feelings (pleasantness, unpleasantness, *etc*)

V. The self is related to other beings who are cognized as feeling pleasantness and unpleasantness.
The sympathetic feelings

VI. The self is related to the environment in an idealizing attitude:
The religious feelings (reverence, contrition, guiltiness)

Lehmann is much more concerned, it is true, with the experimental analysis of various feelings, and especially with the expressive technique. Several original kymographic records are appended. But again we see how the systematic presentation of a 'self' psychology penetrates into a classification of the feelings.

In Külpe we have rather a discouragement of classificatory schemes largely because they can not be strictly psychological but depend like 'lower' and 'higher' on implied standards of life, when the feelings directly attached to sensory qualities like color, tone, taste, or touch are compared to those directed toward a picture or for a piece of good news, or similarly relate, like sensory and intellectual, to their mental dependence on sensations or ideas. There is then no attempt to describe "the qualitative differences within the feelings themselves."[3] No useful result has been attained by any classification to date and Külpe therefore avoids altogether any classification of the feelings. This is quite our own reaction and therefore none is either adopted or proposed. It is our purpose merely to prepare the way for further work based upon valid research in the nature of the emotions, by

[1] H. Höffding, *Outlines of Psychology* (trans. by Lowndes), pp. 233–267, 1891.
[2] A. Lehmann, *Die Hauptgesetze des menschlichen Gefühlslebens*, pp. 343 ff., 1892.
[3] *Op. cit.*, pp. 231–232.

presenting an historical survey of representative types of schemes that have appeared.

4. The Biological Influence on Classification.—Long before the publication of Darwin's epoch-making book, *The Origin of Species by Means of Natural Selection* (1859), and his later work on *The Expression of the Emotions in Man and Animals* (1873), the genetic approach to the mental and physical life was gradually becoming clearer in the writings of the time. It was quite natural, then, not only for psychological systems to assume this underlying doctrine but for classifications of the feelings to show its influence. Biological concepts began to ramify in several directions, but more especially in the emotional field, where so much kinship was deduced between man and the lower animals. It is an influence and attitude which is still with us in a very definite way, than which, perhaps, there is no stronger or more fruitful force.

Herbert Spencer (1820–1903) has the distinction of being an evolutionist in advance of Darwin. He and Bain were probably the last of the associationist school and the first of the genetic psychologists.[1] Spencer's treatment of the emotions, however, is not so schematic as that of Bain. Spencer divides feeling into centrally initiated processes (emotions), and peripherally initiated processes (sensations), with the latter redivisible into those initiated at the outer surface of the body ('epiperipheral') and those initiated within the body ('entoperipheral'). 'Feelings,' however, include the sensations. He repeatedly warns the reader, moreover, against too much artificial analysis:

"Before proceeding to the synthetic interpretation, it may be well to remark that even in our ordinary experiences, the impossibility of dissociating the psychical states classed as intellectual from those seemingly most unlike psychical states classed as emotional, may be discerned. While we continue to compare such extreme forms of the two as an inference and a fit of anger, we may fancy that they are entirely distinct. But if we examine intermediate modes of consciousness, we shall quickly find some which are both cognitive and emotive."[2]

In fact, later he argues that "no emotion can be absolutely free from cognition." Significant, too, is his statement that the first group mentioned above, the emotions, are 'extremely unrelational,' the second somewhat more 'relational' and the last group 'relational' to a comparatively high degree. 'Relations' denote the combining tend-

[1] *V.* G. Murphy, *An Historical Introduction to Modern Psychology*, pp. 113–114, 1929.

[2] H. Spencer, *The Principles of Psychology*, 3d ed., Vol. I, p. 473, 1883.

encies of mental processes in quality, temporal coexistence or sequence, and spatial orders. Through 'mutual limitations' we reach the stage of 'mutual coherence' and 'associability.' Here we have the new and the old in one bottle. The keen insight which prompts the first statement, originally published in 1855, about the importance of cognition in emotion is guaranteed by the persistence of this notion to the present day. Except for a few instances like the 'relational element' in Calkins, Spencer's latter remarks about the relations between feelings came practically to an end with the passing of associationism in general.

The principle to be noted here, however, is that the relational factor lies at the bottom of his progressive evolutionary interpretation of composite feelings and emotions, which incidentally had to do with welfare and balanced function of the organism.

Bain followed this lead and paved the way for a growing tendency to regard some emotions as primary in the matter of development, others as secondary or 'derived.' The primary *genera* of emotions are love, anger, and fear. But that is not sufficient. Emotions may be derived more especially from the pleasures and pains of the senses. From this aspect the emotion of property arises with its secondary derivatives of the emotion of power and the emotion of knowledge. There are therefore the three sources of emotion: the senses, love, and anger.[1] Love, anger, and fear, are nevertheless retained as simple emotions. Of these, love and anger are called "the giants of the group . . . commanding and indispensable members of the emotional scheme."[2] *In toto*, then, we have in Bain the following *genera* of emotions: love, anger, fear, property, power, knowledge, pride, vanity, plot interest, beauty, and moral sentiment. Other emotions separately discussed are novelty, wonder, and liberty as illustrative of *relativity* bearing on emotion, ideal emotion, and sympathy.

Another example of the period, in which subjective observation of human experience was keen and speculation was rife, is McCosh's treatise on the emotions. He, too, struggles with an unsatisfactory terminology; he, too, coins words where existing ones are inadequate. The volume is divided into three books. The first one analyzes emotion into four elements: appetences, ideas or phantasms, excitement with attachment and repugnance, and organic affection. An appetence is represented by motivation, disposition, inclination, and the like and "is simply a tendency of the mind to crave for an object for its own sake." Thus we see that it is more than an impulse or drive and that it is less than a desire. It comes before desire and leads to it. The term is quite suggestive of the conative principle in British psy-

[1] *The Emotions and the Will*, pp. 71–73.

[2] *Ibid.*, p. 76.

chology. The love of pleasure and the aversion to pain either in himself or in his fellow men, the attachments of relatives one to another, inherited and acquired proclivities and talents, organic appetites like hunger, thirst, and sex, sociability, love of esteem, praise, power, and property and finally the aesthetic and moral sentiments illustrate the primary appetences. The secondary, tertiary, and quaternary appetences follow from these as derived motives that become complicated as life itself offers opportunity through habit and ever more persistence toward adopted ends. McCosh tells the well-authenticated story of a miser who, as he was dying, sent for an undertaker and then cheated him in bargaining for the funeral service.

The second element is the idea or phantasm. Here he contributes an original premise that only singular phantasms, those which apply to individual objects, even in the case of general ideas, are operative. This is stoutly defended as over against other associationistic doctrines. Then the third element is treated as a special phase of the law of action and reaction. Excitement is normally followed by revulsion as the nervous energy spends itself and nature is restored to a balance or equilibrium. The fourth element is described as pertaining chiefly to bodily effects. When the good is contemplated, *i.e.*, the appetible is approached, the bodily reactions are pleasant and forward moving; when the inappetible or bad are contemplated there is an unpleasant affection and the bodily reactions are negative and restrictive. Many of the studies on facial expression are brought to bear.

The second book treats of the various principles which are serviceable in the direction of classification. The first line of cleavage in the emotions is to be found in the appetible and the inappetible groups. Again we are told that the appetible may be called good "because our nature clings to it," but it may in fact be morally bad. The reverse is also true. Another line of cleavage is discovered between the emotions directed toward animate and those directed to inanimate objects. Then there are the egoistic and the altruistic emotions and finally the retrospective, immediate, and prospective types. McCosh then proceeds to describe the emotions according to these interlocking principles but chiefly on the mental side. "The grand defect of the account given of the emotions in the present day, by the physiological psychologists, is that they dwell exclusively on the organic affections and leave upon us the impression that these constitute the feelings, and have overlooked the more important characteristics of this department of our nature."[1] He does not disparage either the physiological or the evolutionary point of view, since he makes generous use of citations to both fields and appears to have considerable skill in doing so. Indeed, as we shall point out in a later chapter, he very closely anticipated the Jamesonian theory of emotions.

Bearing in mind that McCosh was a clergyman, we can overlook the many allusions to ethical conduct. Since the mental point of view is consistently upheld, however, both by way of description and by way of classifi-

[1] J. McCosh, *The Emotions*, pp. 113–114, 1880.

cation, we see that a considerable advance has been here made in the portrayal of the affective life. This is especially true since McCosh's point of view is also essentially genetic and evolutionary. In 1880, when Darwinism was still much 'on the carpet,' here was one clergyman who did not get emotional over the theory. At the dedication of the Chemistry-Psychology building at Wittenberg College, Cattell paid a lasting tribute to James McCosh, of Princeton University, who, along with another clergyman, G. T. Ladd, of Yale, sponsored courses in physiological psychology in those early days. It is regrettable that his work on the emotions, now out of print, has not received more notice in the psychological world today.[1]

More recently Shand has presented a much more minute analysis of the emotions following the same procedure, that of keen observation of human behavior and motivation.[2] His list includes the primary *lesser* emotional systems: fear, anger, disgust, curiosity, joy, sorrow, self-display, and self-abasement. The last two he includes with some reservations because he prefers to call these primary systems 'impulses' rather than emotions. They are the primary forces of character that are innate. The last two do not quite fit into some of the real emotions which are to grow out of these primary impulses. Then come the *greater* systems of emotions proper: love is an example which organizes the lesser systems of many emotions such as anger, fear, joy, and sorrow. Parental or maternal instinctive love, or the instinct of self-preservation, and the instinctive drive toward perpetuation of the race open up the way to the next level of the sentiments. There is much that is helpful in these and other analyses but they never reach the level of experimental evidence. The analyses are keen and critical but mostly of deductive origin, based upon a general, though broad, observation of human experience and human relationships.

Another writer who follows the genetic approach is McDougall.[3] His list of primary emotions accompanied by their appropriate instinctive responses are:

Emotion	Instinctive Response
Fear	Flight
Disgust	Repulsion
Wonder	Curiosity
Anger	Pugnacity
Subjection	Self-abasement
Elation	Self-display
Tender emotion	Parental

[1] J. McK. Cattell, Early psychological laboratories, in *Feelings and Emotions: the Wittenberg Symposium* (ed. by Reymert), 1928, p. 432.

[2] A. F. Shand, *The Foundation of Character*, pp. 27 ff., 1920.

[3] W. McDougall, *An Introduction to Social Psychology*, 14th ed., pp 51–84, 1921.

From "these seven primary emotions together with feelings of pleasure and pain (and perhaps also feelings of excitement and depression) are compounded all, or almost all, the affective states that are popularly recognized as emotions, and for which common speech has definite names." In his textbook McDougall has expanded this list to include some fourteen *primary emotional qualities* with their parallel instinctive responses.[1]

Emotional Qualities Accompanying the Instinctive Activities	Instincts (Synonyms in Parentheses)
1. Fear (terror, fright, alarm, trepidation)	Instinct of escape (of self-preservation, of avoidance, danger instinct)
2. Anger (rage, fury, annoyance, irritation, displeasure)	Instinct of combat (aggression, pugnacity)
3. Disgust (nausea, loathing, repugnance)	Repulsion (repugnance)
4. Tender emotion (love, tenderness, tender feeling)	Parental (protective)
5. Distress (feeling of helplessness)	Appeal
6. Lust (sexual emotion or excitement, sometimes called love—an unfortunate and confusing usage)	Pairing (mating, reproduction, sexual)
7. Curiosity (feeling of mystery, of strangeness, of the unknown, wonder)	Curiosity (inquiry, discovery, investigation)
8. Feeling of subjection (of inferiority, of devotion, of humility, of attachment, of submission, negative self-feeling)	Submission (self-abasement)
9. Elation (feeling of superiority, of masterfulness, of pride, of domination, positive self-feeling)	Assertion (self-display)
10. Feeling of loneliness, of isolation, nostalgia	Social or gregarious instinct
11. Appetite or craving in narrower sense (gusto)	Food-seeking (hunting)
12. Feeling of ownership, of possession (protective feeling)	Acquisition (hoarding instinct)
13. Feeling of creativeness, of making, of productivity.	Construction
14. Amusement (jollity, carelessness, relaxation)	Laughter

In a subsequent article, McDougall follows the lead of Shand in avoiding the use of the name 'emotion' in connection with experiences which are not directly accompanied by instinctive patterns of response and are greatly modified by acquired factors. "The true emotional

[1] W. McDougall, *Outline of Psychology*, p. 324, 1923.

qualities, on the other hand, are prior to and independent of success and failure."[1] The "*derived emotions* of desire, prospective and retrospective" are better to be classed as complex feelings which like the simple feelings arise from and are conditioned "by the degrees of success and failure of our strivings, . . . are dependent upon and secondary to the development of the cognitive functions," and denote "merely an ill-defined part of a large range of feeling."

The whole of McDougall's psychology is colored by the notion of the 'hormic principle,' which interprets the behavior and experience of man and the lower animals in terms of consciously purposeful striving and internal drives. It is distinctly of a piece with the genetic conception of the mental life and has its roots avowedly in the Spencerian and Darwinian type of psychology. The underlying hypothesis of this form of approach is clearly and delightfully defended in a recent article.[2] While this is not the place to discuss theoretical interpretations of the affective life, we may gather from his classificatory arrangement that progress has been made from a start that was biologically and philosophically tinctured in the direction of a more psychological point of view. At the same time we can not fail to note that the inherent system of psychology itself again makes a difference in the classification adopted, just as it did in the case of the tridimensional system of Wundt and the 'self' psychology of Calkins.

At this time we should not overlook the group of emotions which Watson has listed "as belonging to the original and fundamental nature of man," namely, fear, rage, and sexual love (in the Freudian sense). These are described on the basis of repeated observations of infants in the earliest months of life. Later on we shall discuss these and many other observations in this connection under the rubric of infant and child psychology. Watson notes that his list agrees with the James's list of *coarser* emotions with the exception of grief, which headed James's list and which Watson regards as a "*reactive state* (connected with love, really) in which the object or situation which usually calls out in the subject the reactions of love is suddenly removed." It is essentially a period of maladjustment.[3]

Perhaps the most detailed classification ever offered is also in the genetic field of psychology, although it presents the situation from a

[1] W. McDougall, Emotion and feeling distinguished, in *Feelings and Emotions: the Wittenberg Symposium* (ed. by Reymert), p. 203, 1928.

[2] W. McDougall, Experimental psychology and psychological experiment, *Character and Personality*, 1, 1933, pp. 195–213.

[3] J. B. Watson, *Psychology from the Standpoint of a Behaviorist*, 2d ed., p. 219, 1924.

much older point of view than that of McDougall. We are referring to the Mercier scheme. How persistent its influence is can be gathered from its inclusion in the fairly recent Seashore text in a simplified and somewhat modified form with the comment that it is "a suggestion indicating the probable trend of future organization within this field and a very excellent basis for exercises in the critical discussion of classification."[1] We herewith give the scheme in full as derived from widely separated sources of seventeen tables in the original presentation, with a few of the modifications suggested by Seashore:[2]

MERCIER'S CLASSIFICATION OF THE FEELINGS

I. Correspondence with interactions primarily affecting conservation of the organism	
A. Environmentally initiated	
1. Correspondence direct	
a. Thermal vibration	
(1) Intensity greater than that of organism	Warmth
(2) Intensity less than that of organism	Cold
b. Mechanical force	
(1) Intensity inappreciable	Touch
(2) Intensity appreciable	Pressure
c. Chemical rearrangement	
(1) On the surface	Smell
(2) Within the surface	Taste
d. Aerial undulation (vibratory motion)	
(1) Irregular (nonperiodic)	Noise
(2) Rhythmical (periodic)	Sound
e. Ethereal undulation (vibratory motion)	
(1) Variations in amplitude	Light
(2) Variations in rapidity	Color
2. Correspondence indirect: Feelings and emotions proper	
a. Antagonism: Agent known as actively noxious and of	
(1) Overwhelming power, and	
(*a*) Does not elicit counteraction	Terror
(*b*) Elicits counteraction which	
1′ Is incipient	Desperation
2′ Is voluntarily suppressed	Resignation
3′ Becomes actual and is	
a′ Successful	Triumphant, Exultation
b′ Unsuccessful	Despair
(*c*) Is not known with certainty	Hope
(2) Superior power, and	
(*a*) Does not elicit counteraction	Fear
(*b*) Elicits counteraction which	
1′ Is incipient	Courage
2′ Is voluntarily suppressed	Patience

[1] C. E. Seashore, *Introduction to Psychology*, p. 331, 1924.

[2] C. Mercier, *The Nervous System and the Mind*, pp. 293–363, 1882.

3′ Becomes actual and	
a′ Takes a passive form	Stubbornness
b′ Is successful	Triumph
c′ Is unsuccessful	Defeat
(*c*) Is not known with certainty	Apprehension
(3) Approximately equal power, and	
(*a*) Does not elicit counteraction	Hate
(*b*) Elicits counteraction which	
1′ Is incipient	Anger
2′ Is delayed	Revenge
3′ Is voluntarily suppressed	Patience
4′ Becomes actual, and	
a′ Takes a passive form	Sulkiness
b′ Is of moderate intensity	Rage
c′ Is of extreme intensity	Fury
d′ Is successful	Victory
e′ Is unsuccessful	Mortification
(*c*) Is not known with certainty	Suspicion
(4) Inferior power, and	
(*a*) Does not elicit counteraction	Contempt
(*b*) Elicits counteraction which	
1′ Is incipient	Vexation
2′ Is delayed	Resentment
3′ Is voluntarily checked	Meekness
4′ Becomes actual, and is	
a′ Successful	Satisfaction of Success
b′ Unsuccessful	Mortification
(5) Insignificant power, and	
(*a*) Does not elicit counteraction	Contempt
(*b*) Elicits counteraction	Scorn
b. Repugnance: Agent known as passively noxious	
(1) To the taste, and	
(*a*) Moderately noxious	Disgust
(*b*) Intensely noxious	Loathing
(2) In other ways, and	
(*a*) Not of superior power	Dislike
(*b*) Of superior power	Abhorrence
(*c*) Of overwhelming power	Horror
c. Kindly feelings: Agent known as beneficent	
(1) Actively, and	
(*a*) Not of overwhelming power	Gratitude
(*b*) Of overwhelming power	Reverence
(2) Passively, and	
(*a*) Not of overwhelming power	Liking to Affection
(*b*) Of overwhelming power	Devotion
d. & *e*. Grievous and joyous feelings: Event known as	
(1) Noxious, and	
(*a*) Distant in time	Anxiety
(*b*) Impending	Dread
(*c*) Imminent	Alarm

(*d*) Does not occur — Relief
(*e*) Has happened — Anguish, Grief to Sorrow, Regret
(2) Beneficent, and
(*a*) Impending — Pleasurable, Anticipation
(*b*) Imminent — Eagerness
(*c*) Does not occur — Disappointment
(*d*) Has happened — Joy, Delight to Gratification

B. Organismally initiated
1. Correspondence with incipient stage of act (neural process) — Will
2. Correspondence with initiation of act (muscular contraction) — Effort
3. Correspondence with reaction of resisting body — Resistance, Hardness, Softness, Elasticity, *etc*
4. Content and discontent. relation of activity to outlet
a. Activity exceeds outlet
(1) In the case of a single activity — Desire
(2) In the case of many activities — Ennui
(3) When the disproportion is prolonged — Discontent
b. Outlet is proportional to activity
(1) Single activity — Satisfaction
(2) Many activities — Contentment
c. Activity has found outlet in excess
(1) Single activity — Satiety
(2) Many activities — *Blasé*ness
5. Freedom and restraint· relation of activity to obstacle
a. Obstacle, as compared with activity, cognized as
(1) Insignificant — Freedom
(2) Overwhelming — Restraint
(3) Equal — Determination
6. Power: relation of exertion to effect
a. Exertion, as compared with effect, cognized as
(1) Insignificant — Power
(2) Slight — Ease
(3) Considerable — Difficulty
(4) Overwhelming — Impotence
7. Correspondence with the ratio of success to failure
a. Success predominating
(1) In important matters — Self-reliance
(2) In small matters — Complacency
b. Failure predominating
(1) Decidedly — Depression
(2) Greatly — Despondency

II. Correspondence with interactions primarily affecting perpetuation of the race
A. Primary: relations between the sexes
1. Correspondence direct
a. Sexual sensations
2. Correspondence indirect
a. Sexual emotions — Love, Jealousy, Modesty
B. Secondary: relations between organism and offspring or progenitors — Filial and Parental Feelings

III. Correspondence with interactions primarily affecting the common welfare: social-conservative
  A. Patriotic
    1. Environmentally initiated
      a. Correspondence with the relation to the organism of an agent that is
        (1) Noxious to the community — Patriotic Aversion, National Hatred
        (2) Beneficent to the community — Piety
    2. Organismally initiated
      a. Correspondence with the performance of an act on the environment of the community, for the benefit of the community — Patriotism
  B. Ethical
    1. General
      a. Correspondence with relation of organism, as a member of a community, to an act of one of the community cognized as
        (1) Beneficial to the community — Approbation
        (2) Hurtful to the community — Reprobation
    2. Particular
      a. Environmentally initiated
        (1) Correspondence with approbation of community which
          (*a*) Is expressed and
            1′ Cognized as deserved — Pride
            2′ Cognized as undeserved — . .
          (*b*) Is not expressed but
            1′ Cognized as deserved — Dignity
        (2) Correspondence with reprobation of community which
          (*a*) Is expressed and
            1′ Cognized as deserved — Shame
            2′ Cognized as undeserved — Martyrdom
          (*b*) Is not expressed but
            1′ Cognized as deserved — Remorse
      b. Organismally initiated
        (1) Correspondence with action of organism cognized as deserving
          (*a*) Approbation — Virtue
          (*b*) Reprobation
            1′ And liable to punishment — Guilt
            2′ Irrespective of such liability — Repentance
        (2) Correspondence with action of organism whose neglect is cognized as deserving reprobation and
          (*a*) As liable to punishment — Duty
          (*b*) As not liable to punishment — Honor
    3. Correspondence with relation of award to desert, cognized as
      a. Equality — Justice
      b. Inequality that is
        (1) Moderate — Injustice
        (2) Extreme — Indignation

IV. Correspondence with interactions that primarily affect the welfare of others: sympathetic

A. Environmentally initiated
1. Relation to organism of an accession to welfare of others which is
a. Cognized as equally deserved by the organism — Envy
b. Not compared with that of the organism — Gratulation
2. Relation to organism of a diminution of the welfare of others which is
a. Moderate — Sympathy
b. Extreme — Pity

B. Organismally initiated
1. Correspondence with performance of an act benefiting others — Benevolence

V. Correspondence with interactions that are neither conservative nor destructive

A. Environmentally initiated
1. Correspondence to an agent cognized as neither beneficial nor noxious: neutral and
a. Of overwhelming power which is
(1) Exerted — Awe
(2) Not exerted — Sublimity
b. Of greatly superior power — Majesty
c. Of superior power — Admiration
d. Of approximately equal power — Respect
e. Of significant power — Curiosity
2. Correspondence to an event cognized as neither beneficent nor noxious — Surprise
3. Correspondence to the reaction of the organism to the action of the environment — Aesthetic Feelings
4. Correspondence with the relation of the organism to the unknown — Religious feeling

B. Organismally initiated
1. Correspondence with an action undertaken for no immediate benefit, but to employ surplus activity — Feelings of Recreation

VI. The Feeling of Cognition

A. With cognition of complete congruity — Conviction
B. With cognition of general congruity — Belief
C. With cognition of incongruity according to the degree of incongruity — Wonder, Astonishment, Marveling, Amazement
D. With cognition of multiformity of experiences — Perplexity
E. With cognition of contrariety of experiences — Doubt
F. Repeated cognitions of contrariety inducing a proneness to doubt — Skepticism
G. With cognition of an experience contradictory of previous experiences — Disbelief
H. With cognition of the juxtaposition of an experience to a previous experience with which it is incongruous, and in comparison with which it is of insignificant magnitude — Ludicrousness

In view of the fact that much of the experimental material which is accumulating today comes from the realm of animal psychology and infant psychology, we have strained the point of space to be devoted

to the classifications which emphasize the response of the organism to the environment. More and more the emotional life develops from within to meet a changing and growing world. As mental processes develop to face a situation of ever growing complexity they too are enveloped by the affective life. This calls for an ever increasing minuteness of analysis when it comes to classification.

5. **Summary.**—At the same time we have noted how the improvement of attitudes within systematic psychology has gradually manifested itself in increasing adequacy of classificatory schemes. None of the more recent ones can be said to involve a minimum of actual analysis of experience and a maximum of logic and speculation. Logic, of course, can not be done away with when organization of materials, however derived, takes place. But the more modern classifications are moving in the direction of empirical, if not experimental, evidence with just enough logic to hold the schemes together.

We found at the beginning that the need for a discussion of classification rested upon the necessity for a proper perspective of what had already been done. The chapter should furnish also a clear notion of the progressional direction of effort in this much desired endeavor. The results, like all attempts in the scientific field, have moved not only from old to new but from worse to better. More than that, gradually in the unfolding schemes of classification we have noticed an increasing effort in the usage of terms descriptive of the affective life. First, for example, we had to have charted out for us a clear area of the affective processes themselves. This started with Tetens, was better delimited by Kant, and then sketched in in detail by Herbart and his followers. A classification typical of this group was here shown.

An outgrowth of this scheme, but now saturated with the doctrine of the tridimensional manifold, was developed in the discussion of the Wundtian classification and in the accompanying exposition of the different classes of simple and complex feelings. Emotions were regarded as complex feelings of great intensity. The temporal course and characteristic of each emotion also appear on the scene. As a matter of fact, while there is a heavy loading of the tridimensional doctrine in this classification, Wundt seems to move in the right direction of classifying by internal description rather than by sheer logical arrangement.

Another instance of systematic influence is seen again in the organization offered by Calkins with respect to the 'self' psychology of which she was such a vigorous exponent. Lehmann's classification as well as Höffding's more extended discussion also reflect a 'self' psychology.

The biological influence really antedates some of the others and also shows a more lasting effect. We traced, through the descriptions given by Spencer and Bain, a decaying associationistic principle of 'relation' and a growing and permanently vital principle of genetic growth of the affective life. The tenor of these passages was still somewhat logical but more and more genetic observations in the realm of the lower animals and of infantile behavior in the human series were beginning to tell. With this movement the discussion of primary emotions and of their derivatives by McDougall and Watson also made a start.

Now the evidence of more than casual and subjective observation is beginning to influence the classificatory schemes. Controlled or semicontrolled animal and child behavior is benefiting our organization of emotional material. More of this type of fact is bound to appear in our generalizations. Noteworthy thus far we found that the most extensive tabular arrangement, that of Mercier, had little if any experimental basis, much empirical significance, and still more of genetic groundwork in it. Taking the genetic approach at its face value we may expect that it will still be the most fertile field of exploration by way of a classification of the emotions and their derivatives.

While some historical perspective has been indicated throughout the chapter, we wished to emphasize the development of various principles of classification and also to show that in most cases the glow of the systematic treatment as a whole spreads itself out over the classification of the affective processes. Whether we shall ever be free of special systems or points of view or 'schools' of psychology is hard to predict. The tendency seems to be toward some central way of regarding mind after the different fads have had their day. We may need them by way of trial and error within the science. But when the science of psychology has reached its full stature and the trials and errors have for the most part run their course, a more stabilized systematic presentation will be in order. Just as the classifications have gradually shown a reduction of logical and especially epistemological influences, probably the all-inclusive treatments of psychological data will themselves make less and less necessary the *a priori* positions that have been taken in the past.

Review Questions

1. Trace the gradual emergence of the affective aspect of mental processes.
2. Illustrate the various fundamental principles that were operative from time to time in the classification of the emotions and other affective processes.
3. Defend the statement that Wundt was among the first to make the classification of feeling follow a truly psychological order.

4. What were Külpe's objections to classificatory schemata?

5. Mention four writers who definitely followed the genetic approach in their classifications.

6. What is the Watsonian basis for the classification of emotion?

7. To what extent is classification based upon observation of fact and to what extent is it dependent upon logical array?

8. Set about to make a classification of emotion on the basis of your own observational experience.

9. Should classification precede or succeed experimental work; what is the function of classification?

10. On what hypothesis have some emotions been termed 'primary,' or lower, and others 'secondary' or 'derived' or 'higher'?

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CHAPTER VI

THE JAMES-LANGE-SERGI THEORY

Some psychologists hailed it as the light of a new psychological dispensation; others as vigorously rejected it; yet others, and they the wisest, went critically to work upon it, examining arguments, weighing evidences, considering objections. There can be no doubt that it has exerted a profound influence upon current psychology, though there can, in the author's opinion, be no doubt, either, that its original formulation was one-sided and exaggerated.

E. B. Titchener, *A Text-book of Psychology.*

1. The Theoretical Approach to the Affective Life.—If the scientific literature on the affective life is historically wanting in factual material and objective descriptions, it is certainly rich in theoretical proposals. With these theoretical approaches, observations of a kind were not altogether lacking. Some data from casual but persistent observations were at hand, of course, before any kind of hypothesis could be advanced, and many of them referred to exceedingly apt illustrative materials. Another admission must also be made here. If a theory gains wide attention as certainly did the James-Lange-Sergi theory of the emotions, it at once touches off still other theories and discussions of the matter in general and thus brings to light research material that may have been pigeonholed waiting for such an opportune moment. It also provokes new research to prove or disprove the theory.

With few exceptions, most theoretical discussions of the affective life had something to do with the relationship between mind and body. Occasionally the theory did not directly divulge the particular type of relationship which lay behind it. Often, however, it more intimately involved a specific point of view in these matters, *i.e.*, the affective theory was interactionistic, parallelistic, double-aspective, unitary, and the like.[1] We need not go into this problem in detail here, but it is important to realize its influence. Similarly we may often become aware of the fact that any 'theory of the emotions,' so-called is likely to be a theory pertaining to the whole of the affective life. Again our terminology is at fault because not all writers, even the more recent ones —to say nothing of historical theorists—accept a standardized terminology, if, indeed, there is one. The arrival of such an increasingly fixed

[1] *V.* C. A. Ruckmick, *The Mental Life*, pp. 16–19 and chart opposite p. 24, 1928.

set of terms is the devout hope of most systematic psychologists today, especially the present writer, but we shall have to be patient. More than that, many of the theories are as much interlocked with the rest of the mental life and its functions as emotion itself, for example, is interlocked with cognitive, conative, and elaborative processes. Abridged statements, such as we shall be compelled to make, will therefore do scant justice to the whole fabric of a theorist's inherent system.

Help may come, perhaps, from some preliminary grouping of the various theoretical positions. Even if we concede that most theories are psychophysiological in scope, *i.e.*, they seek to coordinate bodily processes and functions with mental experiences, we may subdivide them all into those that are specific and those that are general. By specific psychophysiological theories we mean to indicate those which propose some definite neurological center or mechanism as the root of all emotion. Instances of this class are: Calkins's proposal that the fresh and the fatigued cells of the frontal lobes of the brain are ultimately accountable for the feelings of pleasantness and unpleasantness; Cannon's argument in behalf of the thalamus as the switching center of neural currents which effect emotional expression; Crile's phylogenetic theory, which assumes that the Purkinje cells of the cerebellum undergo radical degenerative changes with some forms of emotion; Meyer's contention that the changes in intensity of the neural current, over and above its previous constancy and caused by a force other than that of sensory stimulation, are the underlying correlate; Titchener's suggestion that the free nerve endings are the basic neural mechanisms; and Wundt's hypothesis that the state of nourishment of the front portion of the frontal lobes is responsible. The general theories make broader sweeps and usually involve rather large reactions of the organisms. Pillsbury has given us considerable help in organizing these general theories into three main types.[1] The point of demarcation is not always sharply defined, but the central direction is fairly clear.

2. Specific Theories of Feeling.—The specific theories which try to explain the affective life usually point to some definite part of the nervous system or to some definite manner of neural response. In many instances the plausibility of such theories rests almost exclusively on *a priori* grounds. Let us take, for example, the Calkinsian theory mentioned in the previous paragraph. After approaching the subject cautiously because no "definite physical stimuli of the affections" have been discovered and because the physiological conditions "have eluded

[1] W. B. Pillsbury, *The Fundamentals of Psychology*, rev. ed., pp. 474–479, 1922. These classes are more extensively discussed on p. 143 of this book.

discovery by direct experimental or by pathological methods," Calkins eliminates also peripheral end organs, which are generally "excited by special physical stimuli of which . . . there are none," and also "the sensory cells in the brain," because they already have been fairly well accounted for. So she offers as the most probable explanation:

Bearing in mind that any theory of physiological conditions is uncertain, until it has been verified by experimental observation, we may still profitably

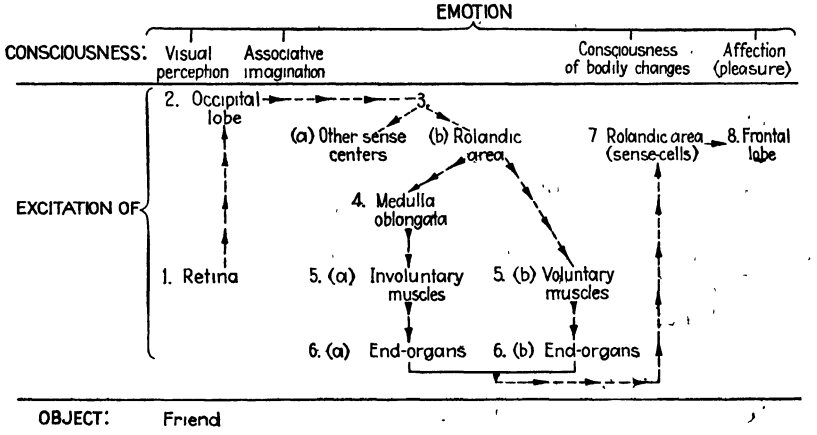


FIG. 8.—Calkins's scheme of neural discharges in emotional experience. The order of the numbers and the arrows indicate sequence of neural events. The two horizontal lines across the figure separate the mental, bodily, and environmental phenomena. The object perceived is a friend. (*Copied from somewhat similar diagram in M. W. Calkins, A First Book in Psychology, 4th rev. ed., p. 215, 1914. Courtesy of The Macmillan Company.*)

guess at the physiological basis for the affections. In the writer's opinion, one plausible account of this physiological condition is the following: pleasantness and unpleasantness are occasioned by the excitation of fresh or of fatigued cells in the frontal lobes of the brain, and the frontal lobe is excited by way of neurones from the Rolandic area of the brain. When the neurones (or cells) of the frontal lobes, because of their well-nourished and unfatigued condition, react more than adequately to the excitation which is conveyed to them from the Rolandic area, an experience of pleasantness occurs; when on the other hand, the cells of the frontal lobe, because they are ill-nourished and exhausted, react inadequately to the excitation from the Rolandic area, then the affection is of unpleasantness; when, finally, the activity of frontal-lobe cells corresponds exactly to that of the excitation, the given experience is neither pleasant nor unpleasant, but indifferent."[1]

The course of events is charted in Fig. 8, which traces the neural path and indicates the corresponding mental events in connection

[1] *A First Book in Psychology*, 4th rev. ed., pp. 209–210, 1914.

with the perception of a dear friend, who has unexpectedly arrived, as the object. It should be noted that the experience of emotion embraces the entire series of mental phenomena with their related physiological processes; only the feeling of pleasantness is itself connected with the frontal area of the cerebrum. The theory is somewhat similar to those of Wundt and Marshall, both of whom were apparently also impressed by Flechsig's atlas of the brain, which assigned no direct functional relation to this area outside associative tendencies. Wundt argues at length against any specific lower center in the medulla oblongata for example, even if the centers for reflex excitation and control of the vital processes, which are so strongly involved in the affective life, are found there. For him the conscious factors are important omissions in any reflex theory, for he regarded the apperceptive factors as by far the most significant for any theory of feeling. Therefore the frontal areas of the brain, which had become designated as the center for apperception, were adopted by Wundt as the neurological correlate of feeling.[1] Those who advocate similar theories are more impressed by the alleged fact, however, that injuries to these frontal areas tended to disturb the emotional life of the individual.[2]

Another instance of a more specific theory of feeling is to be found in Meyer's theory of intensive changes in the neural current additional to the operation of a purely sensory excitation.[3] The theory builds up on some of the other previously proposed doctrines, notably that of Pikler, who explained all selective movements of the body on the supposition that any stimulation undergoes a widespread diffusion all over the body and that any specific movement is the result of energy which does not oppose but agrees in direction with the general nervous ability going on at the time. If opposition does take place and no selection is made by the body, death results.[4] Pleasantness and unpleasantness are themselves "the fact of equal or opposite direction itself." The Meyer theory is illustrated and explained by means of several diagrams, which show in mechanical terms, analogous to those applying to hydraulic situations, the highly integrated operation of the nervous system. He, too, accepts pleasantness and unpleasantness as "states of consciousness differing in kind from sensations, perceptions, images, ideas." His diagrams point to integrations among the sensorimotor neurons involving the higher connecting neurons. "The

[1] W. Wundt, *Grundzüge*, 6th ed., Vol. II, pp. 363–372.

[2] M. Meyer, The nervous correlate of pleasantness and unpleasantness, *Psychol Rev.*, 15, 1908, p. 213.

[3] *Ibid.*, pp. 201–216, 292–322.

[4] J. Pikler, *Das Grundgesetz alles neuro-psychischen Lebens*, 1900.

nervous correlate of pleasantness and unpleasantness must be *some form of activity in the higher nerve centers.*" It is " . . . the *increase or decrease of the intensity of a previously constant current if the increase or decrease is caused by a force acting at a point other than the point of stimulation.*" After answering some preliminary criticisms he gives several examples to illustrate the mechanism.

Suppose a man is going through the customary movements of shaving. Suddenly he cuts himself, receives a painful sensation, and instantly stops the process of shaving. Not pain as a sensation makes the unpleasantness because pain on occasion may be pleasant, as when one tries to see how much harmless pain one can stand through the application of an electric current. But when the body is so organized or the natural reflexes of withdrawal have not been adequately conditioned, a saving mechanism is at once thrown into gear which modifies the original intensities of excitation so that they are decreased and unpleasantness results. The same thing happens when one is unexpectedly bitten by a dog, only in this case the neural condition may have been relatively but not actually one of rest—for the body when alive is never neurally at rest, since muscular tonicity is always present except, perhaps, under conditions of extreme relaxation.

Our comments on the theory would bring to bear a more recently followed principle of the all-or-none activity of neural conduction. Unless present hypotheses are radically overthrown or even somewhat modified, it is difficult to believe that neural intensities through any one synaptic connection vary at all. Either the neural discharge in a neuronal pathway occurs at once and in full measure or not at all in any measure. Besides, the temporal order of events may be questioned: is the unpleasantness felt only *after* or even *along with* the sudden stoppage of the habitual movement when its intensity is decreased, or is it the other way around? To decide the exact temporal order of events is to decide whether or not the theory is acceptable. If the sensation of pain with its usually attendant unpleasant feeling causes the inhibiting movement of halting the shaving process, the theory has the facts reversed.

Another specific theory is advocated by Troland, who, it should be recalled, had assigned to the frontal and prefrontal association areas "*the most appropriate general seat for the region of direct determination of the introspective consciousness.*"[1] We might take time to criticize such a specific locus, since the tendency today is away from definite localization and towards a more functionally inclined hypothesis, but it is more to our present purpose to point out that Troland has thus pre-empted the frontal lobes and can not, therefore, follow the Wundt-

[1] *Op. cit.*, Vol. III, p. 54.

Calkins hypothesis. After relating the course of cortical conductance, which is, of course, the reciprocal of physiological resistance, as plotted in the curves shown in Figs. 9 and 10, he came to a 'formal statement'

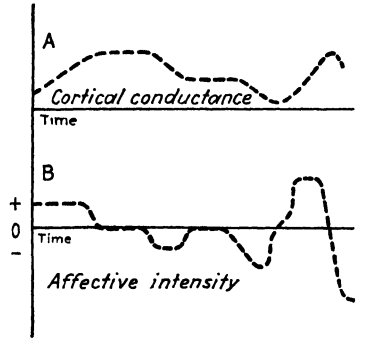


FIG. 9.

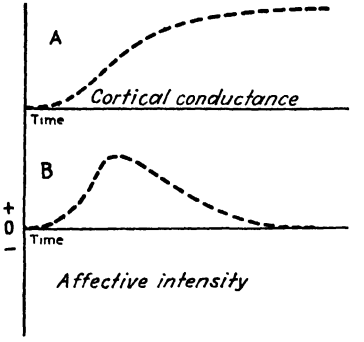


FIG. 10.

FIGS. 9–10.—Troland's hypothesis showing affective intensity related to changes in cortical conductance. *A* indicates the temporal course of supposed changes in cortical conductance while *B* signifies the corresponding changes in affective intensities. Values in *B* are proportional to the *slope* in *A* or to the *rate* of change in conductance. Fig 10-*A* conforms to the standard learning curve and is also correlated with the accompanying changes in affective intensity. (*From Troland's Psychophysiology, Vol.* III, *pp.* 255, 264. *Courtesy of the D. Van Nostrand Company, Inc.*)

of his psychophysiological hypothesis[1] with respect to the affective qualities:

"This hypothesis can be expressed very concisely by means of the equation,

$$a \doteq kdC/dt,$$

which states that the affective intensity, a, at any instant, is proportional (by a constant, k) to the rate of change of the conductance, C, at the same instant. The equation obviously implies that positive values of dC/dt will yield positive values of a, or a pleasantness which is intense in proportion to the magnitude of the time derivative, whereas negative values of the latter will be accompanied by a similarly regulated unpleasantness. In case dC/dt is equal to zero, the affectivity will be indifferent. The equation therefore automatically covers all of the logical possibilities of the psychophysical situation."[2]

He explained that C in the equation represents the conductance of synapses involved in the 'focal synergy' of the given instant and not

[1] This general psychophysiological doctrine had already been advanced in substance more than a decade before, but had aroused little if any discussion. *V.* L. T. Troland, A system for explaining affective phenomena, *J. Abnorm. Psychol.*, 14, 1920, pp. 376–387.

[2] *Psychophysiology*, Vol. III, p. 257.

other outlying conductances elsewhere in the neural system. In this manner, since he emphasized varying rates of synaptic conductances, he approached somewhat the Meyer hypothesis. Conductance stands thus for degree of habituation and changes therein result in affective experiences. It is later called a 'dynamic determinant' "since it is an index of the rate at which specific cortical tendencies are being established or destroyed."[1]

He went on to say that the factor of conductance (*C*) at the end of any given time depends on the conductance already present at the beginning of the period and the net increment or decrement of the conductance during the period in question. Affections obviously are the result of the rate of facilitation and inhibition in the cortex, principally focalized in the frontal or prefrontal areas which in turn are based on the hereditary influence of (1) habituative, (2) retroflex, (3) interactive, and (4) metabolic processes. Among the first are those neural mechanisms of the useful or novel type reported by the neutroceptive class, the visual, auditory, tactual, or kinaesthetic sensory modalities, although other classes may also at times be operative. The increase in the facility of response to these classes of sensations comes with exercise but follows also a law of saturation, as is shown in Fig. 10. Novelty of response also furnishes one of the most usual sources of pleasure. Thus entrancing melodies, on account of their novelty and simplicity, may show a very quick pleasant affective response but they may wear off as quickly as they appealed to the individual in the first place, whereas classical music, though more complex, has a more gradual rise in algedonic tone and a more lasting effect.

Since the organism is highly adaptive to its surroundings and must therefore be fairly elastic and continually adjustable in terms of the beneceptive and nociceptive mechanisms corresponding to beneficial responses that report pleasant experiences and harmful responses that report unpleasant experiences respectively, a new type of action labeled *retroflex* is called for. This action provides a return report to the cortex and therefore a check on the suitability of the response in terms of the general welfare of the organism. Here the thalamus, about which we shall learn considerably later on, especially after we have discussed the James-Lange-Sergi theory, provides a connecting center for all the profuse discharges that make the most minute regulatory adjustments necessary for such a flexible reaction to the environment, however complex that environment may become. Through secondary retroflex mechanisms which are subsequently aroused by means of acquired associations, still further conditioning of response takes place. Moreover, affectively colored experiences interact also among themselves, thus further complicating the response pattern. The effect of drugs and of other environmental stimuli may also be traced through a change in the metabolic rate

[1] *Ibid.*, p. 288.

which either excites or depresses the neuromuscular, neurovascular, and neuroglandular mechanisms, producing thereby a change in the rate of conductance.

While we have been able to present only a condensed statement of the general theory, the interested reader is referred to Troland's original treatise for a more detailed account of a highly evolved and intricately conceived doctrine. Still it is an example of a theory which explains the feelings in terms of neural conductivity. Its plausibility can not be seriously questioned because we have not yet a sufficient number of experimental facts to prove or to disprove it. We can say that it has points of superiority over the Meyer theory since it does not essentially abuse the all-or-none principle nor does it rest on an equivocal factor of temporal order. Throughout the assumption holds that the mental and physiological events are cotemporaneous. From a genetic point of view—*i.e.*, in the course of time effects go back and forth, but the actual sequence of events at any given time when a feeling or emotion is felt need not be regarded as significant to the theory.

Before we leave Troland, we ought to say that he dealt rather briefly with emotions as experiences based upon retroflex action. Emotions present the "subjective aspects of innovated action in the most complete form"; they are highly affective; and they represent "a state of relative unpreparedness, on the part of the individual, to meet the given stimulus situation." It is "a form of experience which goes with the powerful arousal of retroflex action, particularly when the stimulus situation sets off no preëstablished adjustments which are immediately capable of removing the nociceptive stimulus or of continuing the beneceptive one, as the case may be." Emotions may be divided into *positive* and *negative* according to their correlation with positive and negative retroflex action. Fulfillment of a desired goal constitutes satisfaction and leads to positive pleasantness while failure brings disappointment and leads to a negative unpleasant emotional experience. They may be classified again as *primary*, when the retroflex action is governed mainly by hereditary patterns of response, or as *conditioned*, when the response is largely acquired or modified considerably by individual experience. Thus we see that Troland's theory of emotions is an extension of his affective theory and is characterized by the same setting in leading to actions of various types. For purposes of abbreviation we might therefore label it an action theory dependent upon alteration in the rate of neural conduction through the synapses.

The theories of Cannon and Crile we may safely leave until we have discussed the James-Lange-Sergi theory, because there is some historical connection between them. But Titchener's hypothesis is in a sense

independent of this theory. He guesses, as does the present writer in Chapter VIII, that affective processes are "mental processes that might, in more favorable circumstances, have developed into sensations," but not exactly in the same way that we shall propose. He also "hazards the guess that the peripheral organs of affection are the free afferent nerve endings—what are ordinarily called the free sensory nerve endings—distributed through the various tissues of the body; and he takes these free endings to represent a lower level of organic development than the specialized receptive organs, or organs of sense."[1] Since he had already regarded these free nerve endings as organs of pain, he infers that there may be a relationship between this sensation and unpleasantness. But the matter of allocating the cutaneous sensations, with the possible exception of pressure, is still—even at this writing—much a matter of doubt when it comes to specific end-organs. At any rate we can thus perhaps better understand the kinship between the affective qualities and the somaesthetic, cutaneous and motor group of sensations—Nafe's 'felt experiences'—when most of them are referred to somewhat the same sensory apparatus. But the present writer does not see the need for any specifically allocated mechanism, if none existed in the first place in the lowest forms of organisms. It is safer under such conditions to refer algedonic experiences in their simplest forms to the metabolic condition of protoplasmic tissue. Anabolic or 'upbuilding' conditions in the organism would represent pleasantness and catabolic or destructive conditions would represent unpleasantness. As special structures were developed and their corresponding mental processes became more and more complex, the momentarily efficient or inefficient manner in which the entire organisms functioned would determine the character of the emotion. The predominance of processes genetically considered anabolic would lead to a pleasant resolution. Since most emotional situations overtake the organism unawares, the superabundance of catabolic processes required to make a rapid adjustment would ordinarily lead to unpleasantly toned affective response. Perhaps this accounts after all for the predominant groups of unpleasant emotions in any classificatory list.

3. General Theories of Feeling.—As we have noted before, Pillsbury has given us convenient categories under which we may classify the more general theories of feeling. Several of the more specific theories which we have mentioned might also be considered as general theories in their larger import. Any classification of theory must be arbitrary.

[1] E. B. Titchener, *A Text-book of Psychology*, pp. 260–263, 1919.

We are mostly concerned in paving the way for a definite discussion of the James-Lange-Sergi theory.

The first type of general theory may be called the (1) *anabolic-catabolic,* or briefly, the *metabolic* type. It states that pleasant experiences are the concomitants of a well-nourished organism and a smooth-functioning system of responses. All stimuli and environmental situations which fit in or are concurrent with a normal life for that organism are pleasant or pleasurable. While metabolism may thereby be increased, anabolism is favored either during the event or shortly thereafter. When, however, maladjustment suddenly occurs, the organism is 'jarred,' ordinarily smooth-running responses are upset or interrupted, and unpleasantness reigns. A somewhat analogous theory was advanced by Hamilton and Bain, the latter of whom said, "States of pleasure are connected with an increase, and states of pain with an abatement, of some, or all, of the vital functions."[1] Lehmann improved upon this formula by stating the hypothesis: "Pleasantness is the mental result of an organ functioning in such a way that during its activity it does not use any greater amount of energy than the process of nourishment can replace; unpleasantness, contrariwise, is the result of every maladjustment between consumption and nourishment, in that this occurs as much when the consumption of energy exceeds its delivery as when, through some defect in the organ, the delivery exceeds the maximal amount that can be absorbed."[2]

Obviously from our present genetic perspective these statements are too simple and can in their oversimplification be readily refuted. Many of the practices of so-called civilized man can be cited to show that pleasure is often accompanied by excessive catabolism or destruction of tissue, whereas unpleasantness results from processes that should be beneficial and anabolic. The answer lies in the fact that these reactions become complicated through cortical control and can be explained only in terms of genetic heritage.

Let us take examples on both sides of the question. Suppose you are working out a problem in algebra and the solution is forthcoming. The

[1] *The Senses and the Intellect,* 4th ed., p. 303, 1894.

[2] *Op. cit.,* p. 156. Although cautiously stated, Ziehen gives a similar account of the phylogenetic usefulness of pleasantness and unpleasantness. Stimuli that become associated with pleasantness "in many cases directly accompany" movements necessary for nourishment and propagation; those that become associated with unpleasantness "often accompany situations in which animal life is endangered." This formula leaves room for exceptions to occur and yet provides ample opportunity for the establishment of the principle through frequency of association. *V. Introduction to the Study of Physiological Psychology,* p. 151.

telephone rings. You are alone and you may have reason to believe that the call is important. A mental process is interrupted just before completion and the result is almost always an unpleasant experience. Now it can not be said that solving a set of algebraic equations was predominantly anabolic or vitally upbuilding. The point is, however, that genetically considered the free flowing of any organic activity originally involved a minimum of catabolic or destructive processes on the same principle that comparatively little energy is required to keep a physical mass in motion no matter how large or complex it may be. Theoretically, moreover, if it were at all possible to eliminate friction entirely, no energy would be required. Relatively greater energy is required, as in the case of reciprocating engines, to stop such a mass and to send it into motion in the opposite direction. This is analogous to the situation in an emotional experience. When you are enjoying yourself at a picnic and suddenly hear a strange noise in the dark recesses of the woods, the alarm not only sets in motion an entirely new pattern of response that has been built up for the most part through hereditary channels, but abruptly stops whatever was under way at the time. This temporarily, and for some time later, drains energy and causes a preponderance of catabolic activities. In a certain sense, destruction goes on in abundance in order to avoid a total destruction of the organism, just as in backfiring many trees are destroyed to save a much larger area of trees in a forest fire.

Now the objection will at once be raised that this explanation will not do for all unpleasant feelings nor yet for the pleasant ones, since much destructive effect must go on when a profound rapture or joy sets into motion a vast array of muscles and thus destroys much reserve energy. The answer is that a simple explanation is here the most deceptive and that other principles are called into play. All we need to prove is that genetically pleasantness and unpleasantness had to do with anabolic and catabolic processes in the lowest types of organisms, where this vague type of consciousness was the only cue as to the bodily situation. As bodily and mental mechanisms and functions multiplied, conditioning processes were set up to change in many cases the affective picture as a whole. Violent enjoyment and rapture are instances of such processes. One can also say that the violent antics which a young dog goes through in the apparent expression of pleasure at his master, even though they immediately involve momentary catabolism in the amount of energy expended, are after all favorable to the general bodily welfare and immediately lead to an upbuilding process in aid of the general welfare of the organism.

Related to this type of theory, but applying more especially to the more complex emotional expressions, are the three classical principles of Charles Darwin enunciated in his monumental work, *The Expression*

of the Emotions in Man and Animals. These three principles were: (1) serviceable associated habits; (2) antithetic attitudes; and (3) neuromuscular response. The first principle stated that voluntary movements, made through many generations and expressing a useful biological purpose, tend to survive under similar conditions, sometimes in a weakened form, even when no longer useful. For example, in the disdainful grin of superiority, the canine teeth are bared even though we no longer put them to use to prove that superiority. The second principle states that when an organism has made movements that suit a certain situation, these movements are frequently followed by expressions which are exactly opposite to the first group. When, for instance, an organism sets itself for an attack and finds that the object of attack is really a friendly being, just the opposite movements will result, *i.e.*, those of almost excessive crouching in the attitude of servility. The third principle refers to the apparently useless movements which are due to nervous excitation, like the trembling which accompanies fear and the condition of cataplexy which results in certain situations of fright and awe.

But from the psychological point of view the reduction of the emotional life simply to movements and changes of, or within, the body affords an insufficient explanation. The study of the bodily accompaniments of emotion is an exceedingly fruitful one—one that has developed indeed an entirely new series of techniques and one that has far extended our physiological and biological knowledge. Behind it, however, lies the more intricate problem of the relation between mind and body, than which there is probably no more perplexing question, unless it be the more fundamental metaphysical issue of the ultimate reality of the universe itself. We shall have occasion to discuss this matter of the bodily expression of feeling and emotion more fully when we deal with the expressive techniques. The Darwinian principles form an illustration of the application of this type of theory to the evolutionary doctrine of racial welfare in the struggle of evolutionary existence.

This leads us to the consideration of the type of theory usually referred to under the name of (2) *furtherance-hinderance*, or briefly, of *efficiency*. While the aspects of this class of theories vary from one psychologist to another, we find a central theme running through most of them. All movements which continue in an unimpeded manner, which progress smoothly and apparently efficiently, and which normally further the general activities of the organism are pleasant. Hindered movements, opposed actions, and difficult responses are usually unpleasant. Any performance that is interrupted or any movement that is hard to maintain is usually unpleasant in contrast to those which are

easy of execution and well habituated and on the whole successful. These are pleasant.

The explanation has frequently been used to account for the difference between work and play on the general assumption that the former is unpleasant and the latter pleasant. Unless there are higher motives and cerebral 'retroflex' influences which tip the balance the other way, most games are unpleasant in the process of learning, *i.e.*, at least while the learning is hard, whereas they become a source of pleasure when skill has been acquired and success attained. An illustration of this sort of distinction can be told in connection with the visit of the celebrated violinist, Fritz Kreisler, to a university community where he was scheduled to give a concert in the evening. He spent the morning and afternoon before the concert leisurely strolling around. Happening to go into a store where his phonographic recordings were on display, he asked the proprietor where he might buy a book or two. The owner of the store took him to a bookstore near the campus, where Kreisler asked for a classical text in the original Greek language. He wanted to do a little 'light' reading. Greek was a real joy to him, as it is still to some others among a rapidly diminishing group, and might be classed therefore as 'play.' Others—and they are in the majority—would regard it as 'work' if they ever had the misfortune of being exposed to it!

These theories have also been applied to aesthetic principles in empathizing such objects as the leaning tower of Pisa, the broad, ample, squatty lines of a bungalow type of house, the narrow, confined, squeezed-in appearance of a small house between two skyscrapers, and the like. Lipps had the notion that, all the way from the smooth flowing lines of a graceful curve to the generous sweeps of an expansive landscape, the individual felt himself into the situation and experienced the feelings that he would have in that position. If the movements under those circumstances were not halted, or confined, or jerky, pleasantness would result; if the movements were hampered, inhibited, and not freely flowing unpleasantness would be felt.

Stout has gone so far as to apply the principle also to the intellectual activities. He gives an affirmative answer to the question "whether disagreeable processes are essentially connected with obstruction or disablement of conscious and correlated nervous activity, and agreeable processes with the free and unobstructed flow of such activity."[1] "In principle it seems a safe generalization that agreeable experience is favorable, and disagreeable experience is unfavorable, to the effective discharge of mental functions."

The last group of theories include those that make feelings essentially the result of earlier experiences. We may call this class the

[1] G. F. Stout, *A Manual of Psychology*, p. 231, 1899.

(3) *experiential* theories. We have already discussed Wundt's position in regard to apperception. While there is still some reference to the neural substrate as explanatory of the qualities of feeling, the essential factor here stressed is the influence which experience itself exerts on the quality felt. In short, the 'retroflex' condition of Troland is brought to the fore. The interplay of past experience with present experience is so great that the pleasantness or unpleasantness even of rather simple sensory stimuli can not be guaranteed from individual to individual. Anyone who has worked with large numbers of observers who were able to make good analytical reports need not be convinced of this fact. In our records there are at least two otherwise 'normal' female observers who, for example, 'enjoyed' electric shocks applied to the finger tips when, as everyone knows, there is an almost universal dread of this sort of stimulus in the female sex. Some young and ignorant sophomore girls even dread to touch the terminals of a single dry cell!

This type of theory does not take into account the fundamental genetic aspects of pleasantness and unpleasantness at the beginning of the growth of conscious and physiological behavior, but stresses rather the tremendous amount of conditioning which occurs in the growth of the individual. It is quite possible that each group of theory has stressed factors each one of which plays its respective part. At the very beginning the affective qualities might conceivably be tied up with metabolic rates, since this is at that time not only the only mechanism involved but is the most important item in a growing organism on its way toward more complex development in the phylogenetic series. The second type of theory supervenes when higher activities including, according to Stout, the highest intellectual activities are brought into the frame surrounding the phylogenetic picture. Finally, in an attempt to explain the problem of individual differentiation and variation, the life history of the organism itself on both the mental and physiological sides is held to be the arbiter of the affective qualities. If at the same time we keep tentatively in mind that from the beginning there may be a gradual mental integration from whole to part, that as far as the affective life is concerned the peculiar correspondence of the elementary feeling with varying rates of general metabolism may still be operative as a general principle overlapping and interpenetrating the two other principles, we may then get a more satisfactory picture of the ultimate bases for the whole of the affective life. In the same way the second principle of furtherance-hinderance may permeate the other two and finally the last principle, the experiential factor, may in turn be interwoven with the two previous principles. This will be in harmony with the notion of general integration and, although contrary to the test of Occam's razor, may after all be nearer the truth.

4. Anticipations of the James-Lange-Sergi Theory.—Historical references to the bodily organs and mechanisms in an attempt to explain affective and other mental phenomena are numerous. Prominently in such a list occur the names of Aristotle, Descartes, to whom many psychologists allude in this connection, Spinoza, and Lotze. But in the best summary of this material at our disposal, Titchener himself warns us of overinterpreting these sources![1] Often the language is itself either archaic or ambiguous and therefore easily *permits* of a diversity of meaning. Titchener discusses almost a score of such anticipations of the well-known theory and is puzzled by the fact that while James was a resourceful scholar who, by his own confession, "may have been surfeited by too much reading of classical works on the subject,"[2] he failed to fortify his own argument through the citation of historical source materials. Lange quoted three previous writers and referred to two others, but James gave credit only to Henle and then with the reservation, "Note how justly this expresses our theory!" at the same time having failed to note a definition which on the same page ran closely parallel to his own. Irons thus paid Descartes (1649) the tribute of maintaining a position quite similar to the Jamesonian doctrine, but probably inadvertently overread Descartes's actual meanings in his enthusiasm.[3]

One of the earliest more specific adventurers into the field of the vasomotor theory was La Mettrie (1745), who correlated organic disturbances with affective changes. In his book on *Man as a Machine* (1748) he turned, however, more in the direction of the visceral system and offered an explanation of certain hysterical and hypochondriacal conditions in terms of abdominal changes. Malebranche (1674) before him had voiced the same opinion but La Mettrie probably had made independent observations of his own. It must be remembered, however, that he was to French philosophy what Hobbes was to English: a thoroughgoing materialist. Cabanis (1798), quoted at length by Lamarck (1809), made extensive reference to abdominal changes in connection with certain trends. Lamarck says of him:

"Cabanis, noticing that persons who are habitually melancholy and depressed, oftentimes without any real cause, show a practically identical mode of change in the state of their abdominal viscera, drew the conclusion that we must ascribe the melancholy of these persons to this mode of changes, and that these viscera contribute to the formation of thought. It seems to

[1] E. B. Titchener, An historical note on the James-Lange theory of emotion, *Amer. J. Psychol.*, 25, 1914, pp. 427–447.

[2] *Principles of Psychology*, Vol. II, p. 448, 1890.

[3] *Op. cit.*, pp. 291–302.

me that the learned author goes too far. No doubt the changed state of the organs, and especially of the abdominal viscera, often corresponds with the changes of the moral faculties, and even makes a positive contribution to those changes."[1]

In a later passage he divided the bodily cavity for this purpose into three distinct centers of sensibility: (1) the phrenic region, consisting of the diaphragm and stomach, (2) the hypochondriac region, which includes the liver, the spleen, the superior abdominal plexus, a large part of the small intestine, and the great flexure of the colon, (3) the region about the organs of generation, including the urinary system and the lower intestines. Obstruction or irritations lead to certain dispositions and various kinds of mental derangements due to malfunctions of all types.

Another French anatomist, physiologist, and physician, sometimes referred to as the founder of scientific histology and pathological anatomy, Bichat (1800), was explicit in referring emotional disturbances to bodily changes:

"The brain is never affected by the passions; their seat is in the organs of the internal life. . . . It is astonishing . . . that the passions should have neither their end, nor beginning in the organs of the [animal] life, but on the contrary, that the parts which serve for the internal functions, should be constantly affected by them, and even occasion them according to the state in which they are found. Such notwithstanding is the result of the strictest observation.

"The effect of every kind of passion is at all times to produce some change in the organic life. [Consider anger, joy, terror, sorrow, and their bodily correlates.] The functions of the circulation, of digestion, respiration and secretion, are those which are most directly under the influence of the passions. . . . And not only do the passions essentially influence the organic functions, in affecting their respective viscera, but the state of these viscera, their lesions, the variation of their forces concur in a decided way to the production of the passions themselves. . . . In this way everything tends to prove that the organic life is the term, in which the passions end, and the center from whence they originate. . . . "[2]

Tracy (1801) continued the same psychophysical discussion. Certain depressions and even pleasant affections are traced to bodily conditions. "It is not easy to confuse the languor of indigestion," he said, "with that of grief. . . . The same thing holds of all the emo-

[1] J.-B. P. A. de M. de Lamarck, *Philosophie zoologique*, 1809, Vol. II, (ed. by Martins), pp. 267 ff., 1873.

[2] M. F. X. Bichat, *Physiological Researches on Life and Death* (trans. by Gold), pp. 54–74, 1827.

tions, save that emotions properly always include a desire. . . . But the pleasant or painful state of the man is a true internal sensation."[1] Other French physiologists like Buffon (1824), Blaud (1830), Dufour (1833), and Béraud (1853) voiced opinions which run in the same channel. Dufour explicitly introduced the notion of the delay in the experience of emotion until the visceral disturbance had been reflexly produced:

"The mind takes part in our emotions only subsequently to the nervous visceral disturbance which constitutes them; and the activity or inertia which they induce upon our organic functions exists before the mind takes cognisance of it."[2]

Blaud, in the same way, indicated this disjunction:

"An emotion is the perception, pleasurable or painful, of an organic modification rapidly developed as the result of some impression made upon the senses, . . . or produced by some idea present to the mind or evoked by memory . . . [There are] always [in emotion] these four constitutive elements: idea, reaction of the brain, modification of the vital organs, and pleasurable or painful sensation of this modification."[3]

Béraud, though less explicit, follows in the same vein:

"Simple changes in the state of the organs may bring it about that we are more or less disposed to emotions, to joy or depression or desire, by reason of the communication of the viscera, through the intermediation of the great sympathetic, with the part of the brain which presides over the instincts."[4]

Although the French described more frequently the pathological conditions, the Germans were not far behind in setting up a strong case for the organic situation. Lotze (1846) referred to certain moods of exaltation and excitement induced while listening to music or reading poetry or dancing.

"But even if the prime occasion of such a mood lay in the perception of intellectual harmonies, these sensory feelings, which are generated by the intellectual excitement, supervene upon its original content with a new and peculiar power to color the whole experience; while their arrest just as distinctly checks the development of the intellectual feeling. Our thoughts

[1] A. L. C. D. de Tracy, *Éléments d'idéologie: idéologie proprement dite*, p. 26, 1826.

[2] P. Dufour, *Essai sur l'étude de l'homme, considéré sous le double point de vue, de la vie animale et de la vie intellectuelle*, Vol. II, p. 389, 1833.

[3] P. Blaud, *Traité élémentaire de physiologie philosophique, etc.*, Vol. I, p. 178, 1830.

[4] B. J. Béraud, *Éléments (Manuel) de physiologie de l'homme*, etc., Vol. II, p. 627, 1857.

and desires differ, according as we are standing up or lying down; an unnatural and constrained position damps our courage; a comfortable sprawl is hardly compatible with devotion; all our anger evaporates if the body is unmoved; the hand which smoothes the wrinkles from the forehead brushes away the chagrin of which those wrinkles were the sign. . . .

"Our serene enjoyment of beautiful proportions is not simply this abstract pleasure; but in quickened heart-beat, in stronger and easier breathing, in the firm tension of the muscles, we feel our very self uplifted and sustained. Repentance and sorrow for the past are not simply a judgment of moral condemnation, inwardly pronounced and heard only by the soul; the flagging of our limbs, the lessened activity of breathing, the oppression of the breast, . . . in anger perhaps even the spasmic contractions of the bronchi, and the choking movement of the oesophagus that makes the food impossible to swallow, . . . show how the bodily organization too tries symbolically to throw off a burden of contempt under whose weight it is groaning."[1]

Domrich (1849) likewise set up a series of bodily feelings and even referred to various regions of the body as a 'sounding board.' His language is significant:

"These reflected bodily feelings have a far higher importance, for our whole physical life, than is ordinarily believed. Many of the most attractive and most repulsive of our emotive traits owe to them their origin, their continuance, and their characteristic coloring."[2]

Another German physiologist, Nasse (1850), a psychiatrist with many publications to his credit, had this to say concerning the internal situation:

"Since the abdominal organs and the heart exert, in the state of health, a considerable influence upon affective disposition, it may easily happen that, if their activity is in some way deranged, they give occasion, through their connection with the brain, to . . . irregularities of mental function."[3]

Quite accidentally, through an advertisement in the back of Ribot's history of contemporary German psychology, another anticipation of the theory came to our attention, this time from the Scottish school of associationistic intuitionism. In 1880 James McCosh, then president of Princeton College and a Presbyterian clergyman, published an unusually comprehensive book on the emotions. We have already alluded to it. Warren classes McCosh with Thomas Reid and Dugald

[1] R. H. Lotze, *Medicinische Psychologie oder Physiologie der Seele*, pp. 517 f., 1852.

[2] O. Domrich, *Die psychischen Zustände, ihre organische Vermittelung, und ihre Wirkung in Erzeugung körperlicher Krankheiten*, p. 131, 1849.

[3] F. Nasse, Die Wichtigkeit der Beachtung von anhaltenden Gemüthsleiden zur Verhütung von Seelen-Krankheiten, *Rheinische Monatss. f. prakt. Aerzte*, I, 1847, p. 660.

Stewart as belonging to this Scottish school,[1] and Cattell in his inaugural address pays him the compliment of having directed attention at Princeton, together with G. T. Ladd, another clergyman at Yale, toward the development of courses in organic evolution and physiological psychology.[2] Baldwin, a pupil of his, lists two columns of his publications in the *Dictionary of Philosophy and Psychology*. Both Titchener in his historical summary and James himself, however, omit all reference to him—except a reference in the index to James's two volumes, *Principles of Psychology*, which reference does not appear on the page designated and has not yet been found anywhere else.[3] In this remarkable book on *The Emotions* occurs a very striking passage. McCosh first discussed at length and with numerous citations the expression of the emotions in a variety of ways throughout the body. There is every indication that the author explicitly understood the literature and even advanced a step or two beyond it. For example, in a previous section he commented on the bodily expressions as follows:

"'I have often remarked,' says Burke, 'that on mimicking the looks and gestures of angry or placid, or frightened or daring men, I have involuntarily found my mind turned to that passion whose appearance I endeavor to imitate.' Here is an important fact, but it is not correctly stated; that which comes first is put last. The only effective way of mimicking a passion is to call up by the fancy an object or scene fitted to awaken the feeling.

"I rather think that sympathetic action is to be accounted for very much in this way: we put ourselves in the position of others, by calling up by the idea the same feelings, which go out in the same manifestations. Tears shed are apt to call forth tears in the beholder, or quite as readily in the listener to the tale told which makes us realize the position. It is the same with laughter, which is apt to be echoed back till the noise rings throughout a large assembly. When a company as a whole is moved it is difficult for any person to keep his composure."[4]

He makes mention of what he calls 'sympathetic imitation' or 'sympathetic action.' Now comes the section which is as clear a statement of the Jamesonian position as we have seen outside James:

"We are here in the heart of a subject which cannot be cleared up at present,—the reaction of mind and body. If it be true that emotion produces a certain bodily state, it is also true that some bodily states tend to produce

[1] H. C. Warren, *A History of Association Psychology*, p. 12, 1921.

[2] J. McK. Cattell, Early psychological laboratories, *Feelings and Emotions: the Wittenberg Symposium* (ed. by Reymert), p. 432, 1928.

[3] C. A. Ruckmick, McCosh on the emotions, *Amer. J. Psychol.*, 46, 1934, pp. 506–508.

[4] *Op. cit.*, pp. 102–123.

the corresponding feelings. Dr. Braid, in his very curious experiments as to hypnotism, found that a person put in the attitude of devotion became devout. I am not disposed to speak dogmatically about this mysterious phenomenon, but I believe that association of ideas has to do with it. The act of kneeling will naturally suggest the feelings we cherished when we knelt. If we take the attitude of striking the idea of fighting will be suggested. If the expression of affection, or of pity, is assumed, it will call up the feeling associated with it. In the very act of bringing a cloud on the brow the idea of care will be brought up."[1]

Obviously while the reversed process of bodily activity produces an emotional effect of a psychical nature it is not an exclusive process but an alternate possibility, and while the theory is consequently not so definitely worked out in a one-sided manner as in the case of James, it is, nevertheless, a very definite statement of that contingency.

A man in this position, writing a rather lengthy and significant book on the emotions in the year 1880, could hardly have been overlooked by a fellow psychologist at Harvard. That he was known to James goes without saying inasmuch as he is referred to at least once in the *Principles of Psychology*, but not in connection with the topic of emotion. It is surprising, too, that Titchener's historical review fails to mention this contribution to the James-Lange-Sergi doctrine.

We might go on to uncover still other 'anticipations' of the James-Lange-Sergi theory, but we would do no more than to strengthen the contention that the soil for such a theory was well harrowed in advance and that the theory's full fruition was merely a matter of time. Little would we suspect that Darwin, who, in the main, so ably demonstrated the kinship of expressions of emotions that were presumably first felt and then expressed, would also explicitly describe a 'reverberation' of the body. But, as Dewey has himself pointed out,[2] there is at least one reference in his writings which can hardly be 'over-read' to conform to the hypothesis of James, Lange, and Sergi. Again, like the McCosh citation, it did not appear as an exclusive or one-sided theory, but here it is:

"Most of our emotions are so closely connected with their expression, that they hardly exist if the body remains passive—the nature of the expression depending in chief part on the nature of the actions which have been habitually performed under this particular state of the mind. A man, for instance, may know that his life is in the extremest peril, and may strongly desire to save it; yet, as Louis XVI said, when surrounded by a fierce mob, 'Am I afraid? feel my pulse.' So a man may intensely hate another, but until his bodily frame is affected, he cannot be said to be enraged."[3]

[1] *Ibid.*, p. 105.

[2] J. Dewey, The theory of emotion, I, *Psychol. Rev.*, 1, 1894, pp. 554 ff.

[3] C. Darwin, *The Expression of Emotions in Man and Animals*, pp. 239–240, 1873.

In like manner, as Dunlap has suggested,[1] Sutherland, an Australian writer on ethical and philosophical subjects, should probably also be credited with an independent version of the theory. Although published as late as 1898, he had apparently not read James, or Lange, or Sergi on the subject. Yet the statements made by him, as the following quotations will indicate, are again manifest declarations of an 'organic' or 'discharge' theory:

"I hope to establish the general proposition, that emotions on their physical side, consist of alterations in the vascular tone of the body. . . .

"I mean to show, for example, that anger consists primarily of a certain bodily sequence in which, as the result of certain nerve stimulations, the great visceral blood-vessels are sharply contracted. In consequence of this the blood fills with a hard strong pulse all the surface vessels of the body. Hence arises an increased metabolism, and the muscles are supercharged with energy that is capable of being discharged in explosions followed by general lassitude. In this view, however, I shall not ignore, but only for the time being neglect, the conscious phases of anger which seem to be derived from, though so mysteriously different from, the corresponding bodily states."[2]

Continuing the discussion Sutherland divided emotions into "those that exalt and those that depress the bodily powers." They serve to assist in the preservation of the organism against untoward danger and they must therefore act rapidly and automatically. The mechanism for such response is found in the sympathetic nervous system which is intimately associated with the cerebrospinal system. A branch of the sympathetic system goes to the vasomotor areas, which include also the glandular responses. If a sudden stimulus therefore spreads out over the visceral nerves, the vital organs and muscles of the body also respond and it "is thrown into a condition which must be felt in consciousness."[3] A pleasant emotion arises when the blood supply is automatically shut off from the viscera and flows instead into the muscles and the brain; in unpleasant emotions the contrary condition obtains. After reviewing many apt illustrations of his theory from the physiological and biological literature, he summed it up by saying that "our emotions are the effects upon consciousness of altered rates and conditions of flow in those currents of life that ceaselessly course through our bodies."[4] While he was not so explicit as James in the temporal order of events, he had already stated that "on the mental side of three links in the chain of animal activity are—first, the sensation; second, the *emotion* thereby awakened; third, the action thus impelled."[5] The 'sensations' here are, of course, not the 'reverberations' from the visceral region but are analogous to the original perceptual or cognitive processes. The emotion,

[1] *The Emotions* (ed. by Dunlap), pp. 5-7, 1922.

[2] A. Sutherland, *The Origin and Growth of the Moral Instinct*, Vol. II, pp. 212–213, 1896.

[3] *Ibid.*, p. 217.

[4] *Ibid.*, p 264.

[5] *Ibid.*, p. 227.

however, does correspond to the vascular disturbance which follows and the actions either tend to continue the pleasant object or situation or tend to withdraw the organism from the unpleasant surroundings.

We have here a clear picture approaching the James-Lange-Sergi theory. But there are noteworthy differences: (1) the line between the mental side of the picture and the bodily symptoms is sharply drawn and re-emphasized; (2) the temporal order is one of simultaneity rather than one of succession, *i.e.*, when the vascular disturbance occurs it is accompanied by the corresponding mental state of emotion. As far as we have been able to discover, Sutherland does not say that the emotion is nothing more than the sensations returning to the cerebrum from the visceral region.

This roll call must suffice for our present purposes. Other distinguished writers, some of whom were actually mentioned by James, Lange, or Sergi, might be included, but we can already see the drift toward the James-Lange-Sergi theory and in one or two cases almost an exact parallel to it. In all fairness to the theory itself, however, we must acknowledge two rather well-crystallized ideas which, although adumbrated in previous writers, were then, nevertheless, so emphasized and made explicit that we can give credit for them to James and Lange. First of all, James was not a materialist. It was easy enough for Hobbes and La Mettrie to say that the movements of the body, which were physical, constituted the emotional life, which was also physically conceived. James made the sensations from the visceral and muscular system constitutive of the affective life. Secondly, the emphasis was placed on the temporal disjunction. First the reflex mechanism responded, then the sensations, received as a 'reverberation,' became the emotion. Many other writers when they were not materialists were inclined to talk of a parallelistic or an interactionistic system in which the two phenomena, the felt emotion and the bodily symptoms, formed some kind of a correspondence or interrelation. James went one step farther than this. He relied upon the sensations which accompanied the motor and visceral disturbances to become the only component parts of the emotion itself.

5. **The James-Lange-Sergi Theories.**—James began by distinguishing the emotions from the instincts. He acknowledged that "*instinctive reactions and emotional expressions thus shade imperceptibly into each other. Every object that excites an instinct excites an emotion as well.*"[1] The main basis of distinction is that the instincts are described in their "outward deeds" whereas emotional reactions usually terminate in the "subject's own body." After calling attention to "our natural way

[1] *Principles of Psychology*, Vol. II, pp. 442–485; 1890; *V.* also W. James, What is an emotion, *Mind*, 9, 1884, pp. 189–193.

of thinking about these coarser emotions," in which we suppose that the perception of some exciting event is followed by the affective experience, which in turn is followed by the bodily expression, he turned the situation completely around by saying; "My theory, on the contrary, is that *the bodily changes follow directly the perception of the exciting fact, and that our feeling of the same changes as they occur* IS *the emotion.*"[1] He amplified it further by stating that "common-sense says, we lose our fortune, are sorry and weep; we meet a bear, are frightened and run; we are insulted by a rival, are angry and strike. The hypothesis here to be defended says that this order of sequence is incorrect, that the one mental state is not immediately induced by the other, that the bodily manifestations must first be interposed between, and that the more rational statement is that we feel sorry because we cry, angry because we strike, afraid because we tremble, and not that we cry, strike, or tremble, because we are sorry, angry, or fearful, as the case may be. Without the bodily states following on the perception, the latter would be purely cognitive in form, pale, colorless, destitute of emotional warmth. We might then see the bear, and judge it best to run, receive the insult and deem it right to strike, but we should not actually *feel* afraid or angry."[2]

James's name is linked with that of Lange, a physiologist and physician of Copenhagen, because in the year following the first appearance of James's magazine article, Lange had published a similar theory of the emotions.[3] The difference between the two theories lies in the physiological system selected for the immediate bodily expression. In the words, "our whole cubic capacity is sensibly alive," James stressed the visceral and muscular reverberation, whereas Lange referred principally to responses of the vasomotor system involving increased and decreased activity of the smooth muscles, which had already been mentioned in connection with the circulatory changes investigated in the procedure of expression, and the increased and decreased tonicity of the skeletal muscles. These could be combined in various ways to account for blushing *vs.* paling and for restlessness *vs.* sleepiness.[4] Psychologically interpreted the sequence would mean this: first, through the channels of sense, the stimuli from the external world are given a clear channel in the central nervous system straight to the visceral region and the skeletal musculature. Through a reflex chain, therefore, the afferent neural impulse from the sensorium is immediately tied up with

[1] *Ibid.*, p. 449.

[2] *Ibid.*, pp. 449–450.

[3] C. Lange, *Ueber gemüthshewegungen*, 1887, Ger. trans. from *Om Sinsberaegelser*, Kjøbenh., 1885.

[4] *V.* M. Meyer, That whale among the fishes—the theory of emotions, *Psychol. Rev.*, 40, 1933, p. 293.

the efferent or muscular impulse producing contractions in the visceral region and also in the body at large. This, James thought, would give it the quickest possible chance to produce the necessary adjustment required for the most specific biological function under the circumstances. While this reflex mechanism is under way, sensations from it arise and reach the level of consciousness in the brain. Only then can be it said that the emotion is felt or, putting it in other words, the emotion is nothing more than the sensory pattern resulting from bodily expression.

Lange similarly said that the emotions are nothing more than the sensations produced by dilations and contractions of the vasomotor system or the resultant effects of paling and blushing which result. The circulatory system is regulated in its flux and flow through minute muscles which constrict or dilate the main arteries and veins. He also mentioned the sensations derived from the movements of the larger striped muscles of the body. Putting it in still other language, these sensations are constitutive of the experience of emotion and nothing else remains.

An Italian psychologist, Sergi, had developed independently, although a decade later, a theory similar to that of Lange.[1] On the basis of physiological and pathological investigations he had come to the conclusion that in emotional situations there is direct, not reflex, stimulation of the cardiac, vascular, and respiratory functions through the medulla oblongata. The neurological pathways to this region and to the brain are found to be identical and therefore the brain adds only the conscious aspect of the emotion. These vasomotor changes in many cases even precede the visceral disturbances.

A large number of criticisms were at once directed upon the James-Lange-Sergi theory. Without going further into the matter here, one of the crucial comments referred to the very essence of the affective life, namely, the feeling of pleasantness and unpleasantness. If sensations were all that counted in the matter, what happened to pleasantness and unpleasantness, in the shuffle, later on?

Four years later, after the *Principles* were written, James admitted that he assumed the presence of these affective processes throughout but he had a difficult time explaining their presence in terms of his theory.[2] This strikes at the very root of the theory and robs it of its finality. In one breath he said, "If we fancy some strong emotion, and then try to abstract from our consciousness of it all the feelings of its bodily symptoms, we find we have nothing left behind, no 'mind-stuff' out of which the emotion can be constituted. . . . " Four years later he raised the question: "Are these [repugnance, liking] a third sort of affection, not due to afferent currents, and interpolated between

[1] G. Sergi, Sulla nuova teoria della emozioni, *Riv. di Sociol.*, 3, 1896, pp. 23–38. The fundamental principles were set forth in his book on *Pain and Pleasure* in 1894.

[2] W. James, *Op. cit.*, *Psychol. Rev.*, 1, 1894, pp. 519–520.

the gustatory feelings and reactions which are so due?" He answered this question by admitting that all his critics assumed this affective pleasantness and unpleasantness to be another kind of affection which forms the distinctive element of emotion but he admitted it only as a feeling tone of sensation, or as a tinge of the objective content. It may vary in intensity with individuals, but he argued that in his own case it is mild and 'platonic.' He insisted that it is "a part of the sensory experience and as such is due to afferent currents."[1] Time since his day has told against him. Outside the behavioristic camp, to which James himself did not belong, and the few psychologists who give these qualities an out-and-out sensory basis, the affective element of pleasantness and unpleasantness is, as we have seen, generally admitted. Thus, at least in one particular and essential point, James seemed to have taken the heart out of his theory! Baldwin thought that "this is to blow the frog of his original theory up big enough to rival the ox."[2]

But before we go on with the critics of the theory, let us see in detail what James proposed and how he answered the objections that were voiced by the time that the *Principles* were written, namely, the objections that apeared in the six years between his first and second publication on the subject. Let us say, too, that James suffered here as he suffered elsewhere from the use of a too picturesque language—a language that entices the ear but does not satisfy critical judgment. He himself called the treatment 'slapdash,' while Baldwin considered it 'naïve.' Three arguments were brought directly to bear: (1) That such reflex mechanisms of inherited patterns were (*a*) perfectly well known and (*b*) so "*indefinitely numerous*" as to permit by way of permutation and combination a great variety of affective response. The body is called a "sounding board" and its reflex mechanisms are referred to as "bodily reverberations." (2) "That *everyone of the bodily changes, whatsoever it be, is* FELT, *acutely or obscurely, the moment it occurs.*" This was an audacious statement to make at the time and James realized it. But it put him definitely outside the camp of sheer mechanism or the later developed behaviorism, since his emotions required the factor of experience. It could not be so easily made today because no one would claim that he could feel any of the endocrine secretions, for example, or the galvanic response. (3) The appeal to an hypothetical case: take any emotion you like, subtract from it all these consciously felt sensations involved in the reflex, and the remainder will be nothing. The emotion must, therefore, consist of these sensations. Again, this sort

[1] *Ibid.*, pp. 523–524.

[2] J. M. Baldwin, The origin of emotional expression, *Psychol. Rev.*, 1, 1894, pp. 610–623.

of appeal would not be scientifically made today since it merely raises a hypothetical question or situation. The answer would be sought in a much more direct experimental fashion. The imagined situation is never an exact duplicate of the actual one, much less an imagined emotion, as compared with a real emotion.

The explication was further advanced by defending it against the charge of materialism. James reiterated the fact that his was a sensory theory and did not explain emotion literally in terms of bodily movement. Since these sensations present different patterns from time to time, allowance could also be made for an unlimited number of possibly different emotions and a slight difference in the texture of a given emotion, like fear in various individuals.

He realized also the difficulty of an experimental proof. He sought for a pathological "subject absolutely anaesthetic inside and out, but not paralytic," in order to show that emotional reactions might be executed but the emotion itself would not be felt because there were no sensations. He did not at the time find either a satisfactory case nor could it well occur. An approximation to such a case, however, was discovered later by Sollier, before James's 1894 article appeared.

"'I know,' this patient says, 'that I have a heart, but I do not feel it beat, except sometimes very faintly.' When an event happens which ought to affect it, he fails equally to feel whether he makes a strong or a weak inspiration. 'I do not feel myself alive,' he says. Early in his illness he several times thought himself dead. He does not know whether he is asleep or awake. . . . He often has no thoughts. When he does think of anything it is of his home or of the war of 1870, in which he took part. The people whom he sees come and go about him are absolutely indifferent to him. He does not notice what they do. 'They do not appear,' he says, 'like natural men to me, but more like mechanisms.' Similar perturbations of perception occur also in hearing. 'I do not hear in the old way; it is as if it sounded in my ear, but did not enter into my head. It does not stay there long.' His *aprosexia* is complete, and he is incapable of interest in anything whatever. Nothing gives him pleasure. 'I am insensible to everything; nothing interests me. I love nobody; neither do I dislike anybody.' He does not even know whether it would give him pleasure to get well, and when I tell him that his cure is possible it awakens no reaction—not even one of surprise or doubt. The only thing that seems to move him a little is the visit of his wife. When she appears in the room 'it gives me a stroke in the stomach,' he says; 'but as soon as she is there I wish her away again.' He often has a fear that his daughter may be dead. 'If she should die I believe I should not survive her, although if I never were to see her again it would make no difference to me.' His visual images are non-existent, and he has no representation of his wife when she is gone. The weakness of the sensa-

tions remaining to him gives him a sense of uncertainty about all things: 'I am never sure of anything.' Nothing surprises or astonishes him. His state of apathy, of indifference, of extreme emotionlessness, has developed slowly *pari passu* with the anaesthesia. His case realizes, therefore, as completely as possible the experiment desiderated by W. James."[1]

On the basis of this and related hypnotic cases, James brings out six points in his own favor which are:

"(1) Complete peripheral anaesthesia abolishes completely the power of movement. At the same time the limbs grow cold and sometimes blue (p. 247).[2]

"(2) When visceral anaesthesia is added, the patient says she feels as if she no longer were alive (p. 247).

"(3) When totally anaesthetic she feels no normal emotion whatever at the suggestion of hallucinations and delusions which have the power of moving her strongly when the sensibility is restored. When the anaesthesia is less complete she may say that she feels not the usual emotion, but a certain stroke in the head or stomach at the reception of the moving idea (pp. 250, 254).

"(4) When the anaesthesia is solely peripheral, the emotion takes place with almost normal strength.

"(5) When it is solely visceral, the emotion is abolished almost as much as when it is total, so that the emotion depends almost exclusively on visceral sensations (p. 258).

"(6) There is sometimes a very slight motor reaction shown by the pneumograph in visceral anaesthesia when an exciting idea is suggested (Figs. 2, 7 *bis*), but M. Sollier thinks (for reasons of a highly speculative kind) that in complete *inemotivity* the visceral reactions themselves do not take place (p. 265)."[3]

He concluded with the final statement that "the reader sees that M. Sollier's experimental results go on the whole farther than 'my theory' ever required."

In Gardiner's critical review of the Sollier article, however, several disquieting facts are brought to light which can hardly be gainsaid. Both James and Lange are lamentably misquoted in a number of instances. The questions put to the patient were not "particularly searching" and his technique of investigation was not "very exact." As will be noted from the above quotation the patient was, furthermore, not without emotions. In the description of two hysterical subjects, there is again reported a "laxness of procedure" and a "conflicting state of evidence." The patient is supposed

[1] P. Sollier, Recherches sur les rapports de la sensibilité et de l'émotion, *Rev. Philos.*, 37, 1894, pp. 241–266.

[2] Page references here are to the Sollier article.

[3] *Op. cit.*, *Psychol. Rev.*, 1, 1894, p. 529.

in her anaesthetic condition to be free of emotion but she acknowledges that while the knowledge of her lover's adoration gives her no pleasure, she is nevertheless flattered! The whole tenor of the argument is also weak as Gardiner points out:

"But even if it should prove true that bodily and especially organic sensibility is essential to emotion, it is still far from being proved that emotion is constituted solely by feelings of somatic resonance; it might still be that the bodily phenomena were produced, as Sollier once inadvertently writes, 'under the influence of emotion,' or at least of some form of cerebrally-originated feeling. To prove the contrary, it would be necessary to show either that no such thing exists as cerebral sensibility, or that, if it does exist, it is independent of general bodily sensibility."[1]

James then proceeded to answer three objections: (1) that there is no evidence for the arousal of widespread bodily effects through particular perceptions, (2) a 'cold-blooded arousal' of the bodily responses corresponding to the emotion does not produce the felt emotion, and (3) bodily responses to emotional situations do not increase the emotion but decrease it and finally bring it to an end. First of all, he said, there is evidence for these disturbances occurring before the emotion itself is felt. A friend on the brink of a precipice produces in us the "feeling of 'all-overishness.'" We shrink back even though we realize that he is safe. Many individuals have admitted the same feeling in themselves even when, as on a perfectly secure bridge, there is no reason for alarm. Again, if we cause a piece of chalk to 'screech' on the blackboard or file a piece of tin, nine-tenths of the female contingent in the classroom would be 'on edge.' A graduate student who, in the days of equal rights and suffragism, claimed that she could stand everything a man could stand, boasted that witnessing an operation would not in the least bother her. One day in a class in physiology the instructor performed a slight operation on a dog, and she promptly fainted. A colleague on the staff of the Medical College said that recently a student of middle age who had been making a living slaughtering and butchering cattle in country towns, became unconscious when his own finger was pricked in a routine demonstration to obtain a sample of blood in the premedical course.

But the classical account had better be given in the graphic language of James himself:

"The writer well remembers his astonishment, when a boy of seven or eight, at fainting when he saw a horse bled. The blood was in a bucket, with a stick in it, and, if memory does not deceive him, he stirred it round and saw it drip from the stick with no feeling save that of childish curiosity. Suddenly the world grew black before his eyes, his ears began to buzz and he knew no more. He had never heard of the sight of blood producing faintness or sickness, and he had so little repugnance to it, and so little apprehension of any other sort of danger from it, that even at that tender age, as

[1] H. N. Gardiner, reviewing the Sollier article, *op. cit.*, *Psychol. Rev.*, 1, 1894, pp. 544–547.

he well remembers, he could not help wondering how the mere physical presence of a pailful of crimson fluid could occasion in him such formidable bodily effects."[1]

We might meet James here on his own ground and say, if the person reflexly faints when he thus perceives the blood, is that then an *emotion*? These phenomena are not denied. Even when nauseating sensations are felt and are unpleasant, what is there present save unpleasant nauseating sensations? Then, also suppose we grant such affective disturbances; are all emotions to be explained in this way?

To the second objection, James made the admission that the evidence is divided. True it is that many actors try to reproduce as fully as possible all the bodily responses that vent the emotion. Rudolph, in the manual which accompanies the best series of facial expressions of emotion thus far published[2] stated that he would sometimes get 'on all fours' and roar like a lion to produce the expression of rage.

The answer which James gave is that, while the actors do not agree, very likely they could not all exercise command over their 'bodily-reverberations' to the same degree. Today we should say that no one can exercise command over the entire physiological mechanism, since all the reflexes can not be equally controlled by everyone and some of them have never been brought under voluntary control. The heartbeat is an essential ingredient in many emotional states. It has been voluntarily controlled in about a score of cases that have been recorded in the literature. But outside these several cases, few actors can voluntarily interfere with their heart rate. Interesting instances of individual control of what are normally involuntary reflexes continually appear but they are isolated phenomena. Three students have at various times demonstrated to the present writer their control of the pupillary reflex, that is, they could voluntarily expand and contract the pupil of their eyes. Recently a colleague reported that he was able to control a small muscle (*tensor tympani*) in the middle ear, which tenses the tympanic membrane. In this connection a very useful classification of the reflexes with respect to their amenability to control is given by Warren and Carmichael.[3]

It is doubtful, in short, whether it is possible to bring even a sufficient number of these complex mechanisms under voluntary control to reproduce the necessary bodily response required for the production of an emotion. A certain number of them may be used in conjunction with the voluntary musculature to help in the arousal of the proper bodily attitude. But, ordinarily, it could not be complete. James himself admitted this in the statement, "The explanation for the discrepancy amongst actors is probably that which these quotations suggest. The *visceral* and *organic* part of the

[1] *Principles of Psychology*, Vol. II, p. 457, 1890.

[2] H. Rudolph, *Der Ausdruck der Gemütsbewegungen des Menschen*, 1903.

[3] H. C. Warren & L. Carmichael, *Elements of Human Psychology, rev. ed.*, p. 395, 1930.

expression can be suppressed in some men, but not in others, and on this it is probably that the chief part of the felt emotion depends." We should say that a large portion of these organic changes can not be brought under voluntary control.

In answer to the third objection, James distinguished between what is felt during and what is felt after the manifestation. The organic response may be so great that it takes a pathological turn by way of escape. If the normal reaction were given an outlet in the first place, the emotion itself, he said, would subside. From this point on James treated the subtler emotions, or what we have called sentiments, in a similar way. They, too, in so far as they are emotional, are sensory in constitution. He also described secondary emotions that are due to "incoming sensations aroused by the diffusive wave of reflex effects which the beautiful object sets up."[1] He then discussed the genetic development of emotions, especially in regard to the Darwinian theory.

This will afford, perhaps, a fairly complete picture of the James-Lange-Sergi theory. A large number of critical studies appeared shortly thereafter and a considerable amount of experimental work was brought to bear on the hypothesis. There were also attempts to modify the theory in order to bring it into conformity with the Darwinian theory. Dewey's theory is an outstanding case in point. These newer theories and critiques developed up to the present time will be dealt with in the succeeding chapter.

6. Summary.—We first approached the James-Lange-Sergi theory from the side of the specific and general theories of feeling. Instances of the specific theories included Calkins, Wundt, Meyer, Troland, and Titchener. Calkins proposed the physiological state of the cells in the frontal areas of the brain as the fundamental condition of affection but indicated that the complex emotional experience covered the whole of the process from the beginning of the cognition to the terminus of feeling. Wundt mentioned a similar locus but interpreted the resultant feeling from the angle of apperception referred to the frontal area. Meyer believed that the added or subtracted energy along the complex neural pathways over and above the original or normal amount of energy best explained the affective processes. Troland elaborated this explanation in terms of the rate of increase or decrease in such added or subtracted energy at the synaptic centers, with the experience itself assigned to the conscious area in the frontal lobes, and Titchener suggested the free sensory nerve endings as the possible mechanism of feeling. Most of these theories, with the exception of the one sponsored by Titchener, look, therefore, toward the frontal lobes

[1] *Principles of Psychology,* Vol. II, p. 470.

for the conscious experience of emotion, but recognize also the importance of lower centers like the medulla oblongata and the thalamus as distributing centers of neural energy and then regard the rate of discharge either in the matter of intensity of neural current or in terms of the gradient of its energy as indicative of feeling. Increased values in these respects are correlated with pleasantness and decreased values with unpleasantness.

Similarly the general theories can be grouped as (1) *anabolic-catabolic*, or briefly, *metabolic* type, (2) *furtherance-hinderance*, or briefly *efficiency* type, and (3) *experiential*. The first class assumes that pleasant feelings go with unthwarted normal responses which generally tend toward increased vitality and favor either then or later the anabolic or upbuilding processes. Contrariwise the unpleasant experiences result from sudden or general blocking and inadequacy of adjustment, calling for an unusual drain upon the vital forces, and lead to an unbalancing of organic energy in the direction of catabolic or downtearing responses. The efficiency theories look toward the smooth or interrupted functioning of the organism as a whole or of any of its parts. While favorable or unfavorable movements are usually in the focus of these theories, intellectual activity is sometimes, as in the case of Stout, also referred to. Wundt was sponsor for the third type of theory, which also finds its place, in other writers. The only general explanation that is offered is the fact that, above all other mental processes, feelings are greatly modified by experience.

The James-Lange-Sergi theory, which emerges out of this systematic background, attempted to explain feelings and emotion entirely on the basis of the sensory components of automatically made bodily responses. This was so emphasized in the case of James that the usual temporal order of events was reversed. The emotion did not occur until after the sensations from these mechanisms had 'reverberated' from the body itself back to the areas correlated with consciousness in the brain. The theory had a score or more of historical anticipations in a great variety of contexts but sometimes as clearly stated as it was by James himself. When James had later to admit that pleasantness and unpleasantness also existed, much of the 'starch' was taken out of the theory and all that apparently remained is what we still believe—that the emotion is not systematically completed without the bodily component. Lange referred less to the visceral region and more to the vasomotor changes, while Sergi expounded the cardiac and respiratory functions, along with the vasomotor, as direct ingredients in the emotional picture, referring to the cortex of the brain as the final correlate of conscious components.

James's explicit statement of the theory and its analytical defense to objections filed against it were then given in detail. Lastly his treatment of the 'subtler' emotions, the sentiments and the like, was briefly described. We are now ready to trace the modifications and critiques which the theory called forth when more experimental and pathological evidence was accumulated. Much of this evidence was directly or indirectly stimulated through the sometimes heated discussions which surrounded the theory. An impartial survey of the literature reveals the tremendous influence which these discussions exerted in psychological investigations and systematic presentations. The picturesque diction used by James, his interesting illustrations, and even his exaggerated assertions really invited a reconsideration of the whole subject of feeling and emotion.

Review Questions

1. What arguments can you propose against correlating a special locus in any portion of the nervous system with an experienced emotion?
2. Describe three theories that rely upon the rate of neural conduction for their explanation of affective quality.
3. In what way did Troland regard the changes in affective response during learning as a special case of the correlation between cortical conductance and affective intensity?
4. Explain the relation between metabolism and affective experience.
5. State at least five instances of authorities who approximated the James-Lange-Sergi theory.
6. In the terms of modern psychology state the James formula for emotion.
7. State why the case of an anaesthetic patient, described by Sollier, did not completely meet James's requirements.
8. Distinguish between the James, the Lange, and the Sergi versions of the theory.
9. To what extent do the cerebral areas enter the picture in connection with the several theories of feeling?
10. What facts could be brought forward to refute the notion that the James-Lange-Sergi theory was either mechanistic or behavioristic in attitude?

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CHAPTER VII

MORE MODERN THEORIES OF FEELING AND EMOTION

The whale has a twofold distinction among the fishes: first, when seen from a distance, it looms large among them; and second, on close examination it is found to be no fish at all. Something like that I predict for the theory of emotions among the theories in psychological textbooks and periodicals.

M. F. Meyer, *That whale among the fishes -the theory of emotions* *Psychol. Rev*, 40, 1933, p 292.

1. Minor Critiques of the James-Lange-Sergi Theory. - If the amount of negative and positive criticism voiced by outstanding psychologists of the day and of the following decades is any measure of the value of a theory, certainly the theory which we have just reviewed was successful in that respect. The discussion took the form (1) of minor critiques which argued, often vehemently, about some of the issues that had been raised with which the critic could not systematically agree, (2) of counterproposals which called for relatively new theories that would attempt to compromise the conflicting points of view, and (3) of summaries of experimental and pathological research which later contradicted or approved, with slight modifications, the originally proposed theory. Although it is impossible to keep these three trends actually apart in the present chapter, we shall try to bring this important discussion up to date and to follow the threefold front on which attacks have advanced.

Wundt was among the first to react against the theory, but confined his remarks exclusively at first to the Lange version. While he gave credit to the general assumption of emotional expressions he attacked Lange's assumption that any account of the emotions on a purely subjective analysis is speculative and spurious. On that basis most of the work that has built up scientific psychology must be cast out. So he said in effect, "Yes, remove the physical phenomena which accompany the emotion and the emotion vanishes; but also, take away the mental experience of the emotion and the emotion itself disappears." In other words and in another context, if we begin with a normal individual and destroy the body, mind will vanish; if we destroy the mind, the body will soon deteriorate. He reiterated his own position that feeling is a manner or reaction on the part of apperception to the

ideational or cognitive content of consciousness.[1] In an excellent classification and review of the main theories of feeling Wundt also pointed out against the Jamesonian order of events that Lehmann first proved, by experimental means, a reverse of the sequence. The expressive components followed the experienced phenomena.[2] Lehmann himself showed how many of his results coincided with those of Lange, except that he would also include the action of the heart itself in addition to the vasomotor system and that he would also distinguish the physiological result, which is concomitant with the stimulus, and the period which immediately follows.[3]

Worcester brought out the significance of the original perception or idea which is supposed to start the emotion—not, in the Jamesonian language, just the stimulus itself. Caged bears may excite only curiosity, not fear. The reflex chain is, in other words, not so simple as James made it. He thought, too, that there must be something more in the emotion than the sensations resulting from the reflex act, because even the act of vomiting may sometimes be free of any emotion like disgust. Besides, a remembered emotional state, though now reproduced only by imagery and without any trace of sensation, he claimed to be as vivid as the original experience.[4] Irons could not agree that merely consciousness of bodily changes as they occur could be the whole story of the emotion.[5] He also challenged the Jamesonian argument of hypothetically subtracting the organic components from the emotion and supposedly finding nothing left over. Here we are reminded of the Wundtian argument on this point. Irons said how fallacious it would be to contend that because you take away a kingdom from a king and discover that the king as such has vanished, therefore the kingdom and the king are the same thing. He reemphasized the argument made by Worcester that "if I saw an object of terror I should inevitably start, tremble, or run away. *But if I were not afraid, the object would not be an object of terror.* In other words, it is not the mere object which determines the physical effects, but the subjective feeling towards the object." He then proceeded to other grounds of criticism and ended with a constructive statement of what an emotion should include by way of definition and of explanation.

[1] W. Wundt, Zur Lehre von den Gemüthsbewegungen, *Philos. Stud.*, 6, 1891, pp. 335–393.

[2] *Grundzuge*, 6th ed., Vol. II, p. 377, 1910.

[3] *Op. cit.*, pp. 83–95.

[4] W. L. Worcester, Observations on some points in James's psychology, II: Emotion, *Monist*, 3, 1892, pp. 285–298.

[5] D. Irons, Professor James's theory of emotion, *Mind*, n. s. 3, 1894, pp. 77–97.

James attempted to meet some of these attacks but with each concession the original theory obviously lost ground. For example, he replied that his sensory process included the perception of a situation but maintained that this was still reflexly responded to. To the criticism which stressed the variability in the symptoms with the same emotion in the same individual and also the variability in the reactions of different individuals, James answered that more careful inquiry would bring out the fact that the emotion was the same in name only and that there are shades of difference within the large categories that run parallel with differences in the organic reactions. He also commented that there was enough common 'functional' resemblance between men's reactions to preserve a general pattern of similarity. On the whole we must say that while weaknesses in the James theory were beginning to appear, James certainly had aroused considerable interest in the emotions. Future experimental work and theoretical explanations that more modern technical improvements have made possible were started on their way. Not only has research on the neural mechanism moved on to higher levels but psychology has made such a considerable advance in forty years that the systematic points of view held in James's day are no longer strictly applicable. Even the terminology of the science has become further refined.

2. Counterproposals Based Largely upon Theoretical Grounds.—It is difficult to trace rigorously all of the major hypotheses which emanated from the James-Lange-Sergi controversy, for, after all, even that theory had an historical setting. Also new instances and new experimental and clinical results became available as time went on. James lost his large interest in matters strictly psychological and veered off in the direction of philosophy toward the end of his life. The much discussed theory had to do, of course, with bodily expressions interpreted on a reflex pattern and emotions had, through their analogues, the instincts, a genetic or hereditary aspect. Still current at the time the discussion took place, and for some time thereafter, were the three great principles laid down by Darwin in an attempt to affiliate the emotional expressions found in man with those discovered among the lower animals. James had paid relatively little attention to this background except here and there to quote from Darwin the detailed accounts of some of the emotional expressions. But several of the concrete proposals which soon emerged directly dealt with the fundamental principles of Darwin and they also became of essential importance in the later interpretation of the expressive techniques so that we may now digress, at least historically, and briefly discuss these principles in greater detail here than we have before done.

Darwin's language speaks for itself. Only the context need be supplied and the succeeding explanations condensed.

I. *The principle of serviceable associated habits.*—Certain complex actions are of direct or indirect service under certain states of the mind, in order to relieve or gratify certain sensations, desires *etc.;* and whenever the same state of mind is induced, however feebly, there is a tendency through the force of habit and association for the same movements to be performed, though they may not then be of the least use.[1]

This principle was fortified through certain physiological data relative to "the conducting power of the nervous fibers" which "increases with the frequency of their excitement." Sometimes, as Darwin noted, these habituated forms of expression could be repressed by the "control of the will," but even then the force might be so strong that some expressions might escape repression and be recognized in their true nature. In other cases the inhibition would cause other movements, which would also be expressive. With this principle in mind, Darwin made some very interesting observations regarding the former usefulness of facial expressions and bodily postures still to be found sometimes in modified forms among civilized peoples. In a stimulating way Craig pointed out six reasons why Darwin was misled in stating that many of the 'expressions' of emotion are no longer useful in man, or for that matter in many of the lower animals. Darwin had conceived the utility of emotional movements in a strictly biological frame. 'Billing' in a pair of pigeons had been presumably useful because the male may have fed the female at one time in the phylogenetic history of that species. Many male birds, like the rose-breasted grosbeak, still feed the female. But Craig advanced the notion that usefulness may become psychological in the sense that emotional meanings are thus conveyed and that communication of feeling is as important from the mental angle as are the needs of food, sex, and survival from the biological aspect.[2]

The fundamental doctrine of Darwin's theory of evolution rested on the assumption that all our movements inside and out were developed for the better preservation and continued prosperity of the organism in the face of a hostile and often brutal environment. The animals with the most serviceable mechanisms survived. Not a muscular twitch, not an internal contraction was a mere ornament. Everything was or had been useful. While it took thousands of generations to develop

[1] *The Expression of the Emotions in Man and Animals*, p. 28, 1873.

[2] W. Craig, A note on Darwin's work on the expression of the emotions in man and animals, *J. Abnorm. Psychol.*, 16, 1922, pp. 356–366.

some of these reactions, it also took as many generations to eradicate them when they were no longer directly useful. There was a certain inertia at the start and a momentum at the end. Therefore, we have in our systems these ingrained responses which may in some cases be useful; in other cases no longer serviceable since the advent of civilization. But civilization is the thinnest crust overlying many strata of earlier formations. The whole idea of expression revolves around this notion of habit, a term which Darwin broadened to include racial habit rather than individual learning. That this racial habit is modifiable, the first principle admits. But it is only relatively so. While emotional expressions now serve chiefly the function of communication or interpretation of experience from one person to another, in the lower animal world their service was highly individualized and served drastically and effectively as a means of coping or struggling against an often unfriendly environment. To these we shall have to recur later when we discuss the technical approaches through facial expression. Some of the most interesting observations concerning facial expression come under this general heading.

The second great principle enunciated by Darwin was that of antithesis.

"II. *The principle of antithesis.*—Certain states of the mind lead to certain habitual actions, which are of service, as under our first principle. Now when a directly opposite state of mind is induced, there is a strong and involuntary tendency to the performance of movements of a directly opposite nature, though these are of no use; and such movements are in some cases highly expressive."[1]

This factor brings with it again some very significant attitudes. Darwin was a keen observer and a still keener analyst. Turning now to the lower animals, Darwin gave a good example of this principle of antithesis:

"When a dog approaches a strange dog or man in a savage or hostile frame of mind he walks upright and very stiffly; his head is slightly raised, or not much lowered; the tail is held erect and quite rigid; the hairs bristle, especially along the neck and back; the pricked ears are directed forwards, and the eyes have a fixed stare: These actions, as will hereafter be explained, follow from the dog's intention to attack his enemy, and are thus to a large extent intelligible. As he prepares to spring with a savage growl on his enemy, the canine teeth are uncovered, and the ears are pressed close backwards on the head; but with these latter actions, we are not here concerned. Let us now suppose that the dog suddenly discovers that the man whom he is approaching, is not a stranger, but his master; and let it be observed

[1] *Op. cit.*, p. 28.

how completely and instantaneously his whole bearing is reversed. Instead of walking upright, the body sinks downward or even crouches, and is thrown into flexuous movements; his tail, instead of being held stiff and upright, is lowered and wagged from side to side; his hair instantly becomes smooth; his ears are depressed and drawn backwards, but not closely to the head; and his lips hang loosely. From the drawing back of the ears, the eyelids become elongated, and the eyes no longer appear round and staring. It should be added that the animal is at such times in an excited condition from joy; and nerve-force will be generated in excess, which naturally leads to action of some kind. Not one of the above movements, so clearly expressive of affection, are of the least direct service to the animal. They are explicable, as far as I can see, solely from being in complete opposition or antithesis to the attitude and movements which, from intelligible causes, are assumed when a dog intends to fight, and which consequently are expressive of anger."[1]

Darwin is full of amusing cases where one movement was set against another as a substitute. He mentions the Cistercian monks who "thought it sinful to speak, and as they could not avoid holding some communication, they invented a gesture language in which the principle of opposition seems to have been employed."

From these cases of animal behavior we can easily go to similar responses on the part of man. We often notice that, with a clearer realization of the situation, one set of movements and attitudes may be followed by movements that are quite contrasting in nature. Suppose a man of relatively weak physique becomes exceedingly indignant or even angry at the punishment which his son says he receives at the hands of a neighbor. He leaves the house with a great bluster, clenching his hands, throwing back his head, and swelling his chest with confidence. In a moment he sees the neighbor, who turns out to be a robust and vigorous man, perhaps even of a pugilistic type. The grimaces which pass over the father's face, the attitude of slinking away and trying obviously to be pleasant, have often been caricatured in comic supplements and in the theater. They are quite opposite to those reactions which were serviceable in the previous predicament. Often, too, when a person has broken a valuable dish or committed some other offense, which he must needs report, instead of expressing the usual symptoms of sorrow and regret, the demeanor will often be on the verge of if not actually an expression of a pleasant experience and even result in a nervous and silly grin. From one extreme type of response the pendulum swings to the other, and the change usually looks ridiculous enough to have inspired many of our comic artists.

The third principle formulated by Darwin has a long title. It is called "the principle of actions due to the constitution of the nervous

[1] *Ibid.*, pp. 50–51.

system, independently from the first of the will, and independently to a certain extent of habit." For the sake of brevity he calls it "the direct action of the nervous system." The hypothesis here is that "when the sensorium is strongly excited, nerve force is generated in excess, and is transmitted in certain definite directions, depending on the connection of the nerve-cells, and partly on habit: all the supply of nerve force may, as it appears, be interrupted." It appears that there were left over a number of expressions which could not be classified under either one of the two previous principles. They were, nevertheless, expressive, in the Darwinian sense, or, as we should say, they resulted from the emotional situation.

Darwin cited an authentic instance from the records in the case of a man brought out for execution in India whose hair became suddenly white. "The change of color was so rapid that it was perceptible to the eye." This physiological change was attributed to strong emotions of terror or grief. Another example under this principle is the trembling of the muscles found in many of the lower animals and in man. This trembling, he pointed out, performs no useful function and is often, indeed, a distinct handicap but, nevertheless, is present under a variety of circumstances including pathological conditions attending fever fits, blood poisoning, and delirium tremens. It occurs also in exhaustion after excessive fatigue or after any strenuous exercise. Among the emotions characterized by trembling are fear, anger, and joy. Darwin mentioned an example from his own experience: "I remember once seeing a boy who had just shot his first snipe on the wing and his hands trembled to such a degree from delight, that he could not for some time reload his gun; and I have heard of an exactly similar case with an Australian savage, to whom a gun had been lent."

Other manifestations are the secretions of the alimentary canal and of certain glands, the reaction of the heart and the entire vasomotor system, together with writhing and frightful contortions accompanying the agony of pain. The cause for this rather widespread reaction Darwin ascribed to the large quantity of liberated neural energy which must expend itself in some direction. He quoted liberally from Herbert Spencer on this point and closed his exposition with numerous illustrations from his own travels and from the accounts of explorers.

Curiously enough, our present notion is both to agree and to disagree with Darwin. The entire drift of neural doctrine today is in the direction of less stress on restricted mechanisms and more emphasis on a rather widespread integration of neural functioning. The simple reflex is recognized as a systematic artifact: no simple reflex occurs without energy also going to other centers and ultimately to the cerebral

levels. With this we agree. It is needless also to say that we have carried this notion experimentally and theoretically much farther than was known in the Darwinian or even Jamesonian times.

The disagreement comes when we regard this spread of energy as a 'surplus.' A similar attitude has been taken in regard to the theory of play known as the 'surplus energy' theory. The first question that occurs is: a surplus for what? The concept always contains a teleological factor. In Darwin's point of view there is apparently a sufficient amount of energy for producing serviceable reactions, or their remnants, and for making antithetical movements. After all this is achieved, there are still other reactions which serve no apparent function and are, therefore, left over. In a sense they are as useless as the antithetical movements, although in present-day knowledge we have discovered uses, to be sure, for the endocrine secretions, noticeably for the action of adrenal in causing glycogen to be secreted. In the absence of these known facts, it was quite legitimate for Darwin to suppose that a surplus of energy was present. We should rather say today that the energy aroused in all parts of the body, whether it be nervous or not, is the result of the stimulation of the whole organism. Only with the assumption that some of these reactions must be serviceable and expressive goes the consequent conception of a surplus.

It was at this point among others that John Dewey tried to make peace between the Darwinian and Jamesonian theories.[1] He made a number of categorical points. First, he began with the term 'expression of emotion' which he claimed "begs the question of the relation of emotion to organic, peripheral action, in that it assumes the former as prior and the latter as secondary." This, as well as the underlying notion in the James-Lange theory, he asserted, is false. The James-Lange version he called the 'discharge theory.'

He then proceeded to point out that there are no muscles that function primarily for purposes of expression. Expression is something seen from without by another individual but is in reality nothing more than a physiological function or even a necessary physical event. Putting it another way, the phrase, 'the expression of emotion,' can not be construed as having any biological function at all from the angle of *emotion*, and Dewey doubted whether there is any emotion to express. This led him to the next point, that all reference to emotion, as such, is not only irrelevant but gratuitous. The whole mechanism of expression can be explained in terms of itself as an *act*, with emotion left out. At this stage he introduced in more positive form his own oft-quoted contribution to the theory of emotions. One wonders, of course, why

[1] *Op. cit.*, pp. 553–569.

in terms of his logic, it is a theory of *emotion* at all. It appears that the answer comes, as it comes to all similar propositions, in terms of common usage.

Darwin, James, and now Dewey simply mean to say that what we commonly call an emotion, what we half-introspectively know as such, can be more specifically referred or equated to expression and the rest, in Darwin's case, to visceral and muscular sensations in James's case, and to vasomotor phenomena in Lange's case. Now Dewey proposed that when neural energy is well organized and coordinated and moves "along frictionless lines of action," when it is "harmonized activity," we have joy and allied pleasant emotions. When there are two opposed lines of activity, not working out smoothly and introducing also some intellectual or ideational materials, as in questions of doubt, we have the unpleasant situation of sorrow and grief. Laughter is defined as an accumulated series of energies which are suddenly released through the respiratory and vocal mechanisms. He then passed on to deal more intimately with other Darwinian principles by scrutinizing the emotion of grief, which he considered a breakdown in the habitual teleological machinery. This type or response, which is called idiopathic, gives evidence of less particularized discharges, which are contrasted with and differentiated from the useful well-organized discharges. Idiopathic responses are disturbances, defects, and alienations in the adjusted movements and contain no emotional quality in them at all.

His thesis then was to turn the sequence around. We must not start with the emotion and then get at its expression. It is better to begin with the movement, describe it from its various angles, and from it derive the emotion. A completed and coordinated series of movements gives one emotion, for example, that of joy. In some cases pathological conditions are approached in the emotional life of an extreme sort and are well illustrated by the complete breakdown of coordinated responses. As a parting shot at the Darwinian theory, Dewey showed that antithesis is an extremely limited principle occurring only in domesticated animals and in man in so far as they and he are made conscious of self. It is a *self*-directed attitude of humility and affection inbred in trained animals and superimposed, as it were, on their original nature. Many of these antithetical movements, he believed, may be discovered to be remnants of formerly serviceable actions.

In a subsequent article[1] he focused his attention more directly on the James-Lange, or discharge, theory. His ground had already been cleared of emotion, as it were, and he considered again the movements

[1] J. Dewey, The theory of emotion, II, *Psychol. Rev.*, 2, 1895, pp. 13–32.

either as direct survivals or as disturbances of teleological coordinations. He diagnosed James as having stressed the physical basis of emotion and not the psychical. Or, putting it another way, James centered his attention on *feeling*, or better, *acting*, angry and not on *being* angry. This brought Dewey presently to his own formula:

"Emotion in its entirety is a mode of behavior which is purposive, or has an intellectual content, and which also reflects itself into feeling or Affects, as the subjective valuation of that which is objectively expressed in the idea or purpose."[1]

Two distinctions must be made: (1) that the emotion is first of all a "disposition, a mode of conduct, a way of behaving," and (2) that the essence of it is ethical. Only secondly is it psychical in James's theory. But in the complete analysis it also has essentially an intellectual content, "a prepositional reference." A full emotion contains an object representing the 'at,' or 'about,' or 'on account of' something. All this becomes "an integral phase of the single pulse of emotion." As other critics put it before him, but not so cleverly, Dewey pointed out that the "idea of movement" could not come back from the viscera. Running away is a part of the emotional seizure. His conclusion then is:

" . . . that the mode of behavior is the primary thing, and that the idea and the emotional excitation are constituted at one and the same time; that, indeed they represent the tension of stimulus and response within the coordination which makes up the mode of behavior."[2]

But there remains a much more difficult problem: the question of the feeling tone of sensation; and here Dewey becomes somewhat abstruse and awkward. The *Gefühlston* represents, he said, "the complete consolidation of a large number of achieved ends into the organic habit or coordination." It is interest 'read backwards.' Certain movements that may have formerly been useful degenerate into mere tendencies to action. When they are instinctively aroused into action and are integrated into the kind of experience that has a content and an organic seizure then they become *Affekte* or emotions. When this coordination grows thoroughly 'habitual' and 'hereditary,' then it retrogresses to a *Gefühlston*.

Thus is emotion again reestablished on the psychical level but the stress is still behavioristic in terms of mode of conduct and there is much teleology and purpose in it. It bespeaks either, on the one hand,

[1] *Ibid.*, p. 15.
[2] *Ibid.*, pp. 18–19.

a smooth running machine or, on the other hand, one that has been at least temporarily upset. Dewey contributed, therefore, in three specific ways. (1) He made some sort of peace between Darwin and James. The movements of expression stripped of their 'expressive' dress are, nevertheless, given a racial and biological significance. This hereditary basis of the movements, whether they be serviceable or not, has come to stay in our present description of the emotions. (2) Emotion is rehabilitated on the sheerly mental side by giving it ideational content and distinguishing the full pulse of mentally *being* emotional, from its partial phase, that of organic *feeling*. The formula of James was too simple and one-sided. Bodily response in both Darwin, who as biologist had a right to this limitation, and James, who as psychologist did not have this right, has been given its function as teleological social conduct. There still remains a purely scientific analysis of what it is like to be emotional. Dunlap, for example, in a more recent paper,[1] again raises the question whether we are not stressing too much the purposive character of the emotions. "'Emotions' can be named: we can speak, for example, of anger, fear, and grief. But these names represent no psychological entities, no unique affective processes. They are names applied to varying complexes in the affective content, that are teleologically chosen."[2] They must not be described primarily in terms of the situations in which they arise, but they must be studied psychophysiologically rather than neurologically. An analysis both of the mental nature of the emotion and of the organic reactions must be made. His challenge is noteworthy:

" . . . the modified James-Lange theory of *emotion* remains a permanent contribution to the armament of psychology. There is neither hope nor good sport in investigating emotions except as organic or bodily states: products of response to the environment, not intermediaries in response."[3]

(3) A valuable distinction was made between those motions or responses which have an emotional setting and those which like many of the Darwinian reactions that came under the third principle are not emotional at all. The instance given is significant: "The child, who ceases to be angry at something—were it only the floor at last—but who keeps up his kicking and screaming, has passed over into a sheer spasm. It is then no more an emotion of anger than it is one of aesthetic appreciation."

[1] K. Dunlap, Are emotions teleological constructs?, *Amer. J. Psychol.*, 44, 1932, pp. 572–576.

[2] *Ibid.*, p. 573.

[3] *Ibid.*, p. 576.

There are many responses, internal and otherwise, that may or may not be accompanied by emotional feeling. To name these emotional is one of the flagrant errors of behaviorism. To have distinguished the *being* emotional from the organic *feeling* of emotion was a service to the psychology of the affective life, but Angell was probably right when he referred to the Dewey theory as "a brilliant formulation which has suffered even more than James's by the inability of the public to understand it."[1]

While the Dewey theory has not had either the approval or the rebound that the James-Lange-Sergi theory enjoyed, probably because of the very strong competition and the more captivating imaginative appeal of the latter theory, it has found at least one strong proponent in Angier, who believed that Dewey's "basic conception to be perhaps the most significant—next to James's—that has appeared in emotional theory."[2] The crucial point of departure is, he found, in Dewey's refusal to separate the three component parts in the Jamesonian temporal array, "the object or idea operating only as a stimulus," "the modes of behavior taken as discharge of this stimulus," and the "*affect* as sensory repercussion of the discharge." Dewey refused to admit that such a stimulus could be isolated because it is in turn determined by the act that results at the time: there is mutual interference between the two and the meaning of the object perceived is therefore derived from the behavior which consummates the cognition. In addition, the very birthright of the emotion issues from the conflict with which such a behavior is faced and the emotion as such "exists only during the 'checking'" of incompatible attitudes, such as one of attention involving curiosity concerning the proverbial and much overworked bear and those involving activities of retreat when the bear is perceived as a dangerous object. Not the repercussions from the viscera, *etc.*, are significant but the repercussions attending the conflicts arising from two opposing modes of behavior. This conflict need arise from nothing more than the sudden interruption of the customary and normally routine activities of everyday life through the presentation of objects and situations which have attached to them strongly hereditary modes of conduct. Angier quoted Bernard and Drever, who clearly specify *inhibition*, *interruption*, *delay*, or *modification* of behavior in the first instance, and *tension* in the second case.[3] American psychologists are likewise referred to with similar contributions. Angier summed up the situation by redefining the emotion as follows:

"Emotion arises only when these other reactions (implicit or overt) [which are momentarily set in motion through powerful drives in the face

[1] J. R. Angell, A reconsideration of James's theory of emotion in the light of recent criticisms, *Psychol. Rev.*, 23, 1916, p. 253.

[2] R. P. Angier, The conflict theory of emotion, *Amer. J. Psychol.*, 39, 1927, pp. 390–401.

[3] L. L. Bernard, *Instinct*, p. 505, 1924; J. Drever, *Instinct in Man*, p. 143, 1921.

of suddenly presented objects and situations] are so irrelevant as to resist ready integration with those already in orderly progress towards fruition [which typify the organism's present total 'set' and lead to its ultimate satisfaction and the termination of the 'set.']."[1]

In closing, however, he left the question open as to what *is* the emotion which he claimed was "not germane to the main issue." This was, nevertheless, apparently germane to James's issue, at least in the original formulations. We notice again that the Dewey theory is allied to the general concept of the affective processes, except now we have only the stress on the hindrance side of the formula, unless, indeed, as so many authorities have indicated, emotions are largely of the unpleasant sort or, at least, are so defined and described.

It may be well to recall that Munsterberg, in conformity with his well known 'motor theory,' had interpreted the affective qualities in connection with muscular reactions. On the basis of a number of incidental studies, which were unfortunately not extensively carried out under the best conditions of laboratory control, he concluded that reflex extensions and flexions of the voluntary muscles are the underlying conditioning factors which correspond with pleasantness and unpleasantness. That position is his amplification of the James-Lange theory:

" . . . extension and flexion are not caused by pleasantness and unpleasantness, but contrariwise the reflexly manifested extensions and flexions are the conditions underlying those mental processes which we call pleasantness and unpleasantness."[2]

Allport from a slightly different angle pointed out that the emotions can be distinguished by means (1) of an affective element, *e.g.*, on the basis of their pleasantness or their unpleasantness, and through (2) a differentiating factor 'x.' Both of these, according to the James-Lange principle, are constituted "of bodily sensations resulting from diffuse patterns of response to the stimulating object."[3] Looking for a physiological basis for the first factor, Allport disagreed with the opinion of Cannon and earlier investigators that the bodily responses were so much the same that no differentiae could be found for the great variety of emotional experiences. The similarity of visceral responses became the physiological criteria of the affective element, pleasantness and unpleasantness. Pleasantness results from the activity of the craniosacral branch of the autonomic nervous system which "innervates those responses which follow immediately upon the attainment of objects, food, and sex." Unimpeded efferent impulses involved in

[1] *Op. cit.*, p. 401.

[2] H. Münsterberg, *Beiträge zur experimentellen Psychologie*, Pt. 4, p. 227, 1892.

[3] F. H. Allport, A physiological-genetic theory of feeling and emotion, *Psychol. Rev.*, 29, 1922, pp. 132–139.

digestion and reproduction furnished "the two primordial pleasures of mankind." Unpleasantness is the result of the response of the sympathetic branch of the autonomic which checks digestion and the reproductive activities, accelerates the heart-beat, constricts the blood vessels, and reinforces its activity further through the secretion of autacoids. The emotions studied or reported by Cannon were all unpleasant—therefore the identical bodily pattern was aroused. Through ontogenetic conditioning or response the types of response which become either pleasant or unpleasant may become greatly modified and a vast array of objects and events may be included besides the more primitive ones.

In support of this first part of his argument he pointed out that unpleasantness is more readily identifiable by direct introspective report and is more forceful than pleasantness. Unpleasant experiences are also more numerous and 'more characteristically emotional' than pleasant ones. He claimed that this was as it should be, for the sympathetic efferent impulses are stronger because of the resistance of the ganglion bodies than the impulses of the craniosacral impulses which they tend to inhibit. Besides, they are more generously distributed through the viscera and they arouse somatic motor activities of a more violent sort. Allport further strengthens his case by showing that the longer delay in the arousal of unpleasant feelings, reported in the case of anger and in several instances in his own experience, than in the case of sudden thrills of joy can more easily be explained by the longer time of transmission required in unmedullated post-ganglionic fibers, in the extensive spread of the energy, and in the resistance of the ganglionic synapses. This delay, we must say, is still open to experimental confirmation on both psychological and neurological bases. To the writer's knowledge no extensive research on this problem from either angle is at hand; but it is a problem worth following up. Since mixed feelings, as we have seen, are probably nonexistent in the strictest sense of the term, Allport found additional support in the fact that both branches of the autonomic system would therefore not be called upon to function at the same time—which would be well-nigh an impossibility.

For his 'x' factor he relied upon the proprioceptors in the muscles, tendons, and joints, which would furnish a variable complex pattern apart from the organic sensations from the viscera. In other words, the James-Lange-Sergi theory is split into two parts to serve the Allport theory. The organic changes as such, comprising visceral, vascular, respiratory, and other 'organic' or somaesthetic responses find their function in differentiating pleasant from unpleasant emotions; the kinaesthetic or motor group of sensations, in different combinations and permutations, account for the greater variety of emotional experiences. He went on to justify this theory in terms of the genetic development of emotions in children and on the basis of the early functioning of the autonomic system, antedating the cerebrospinal responses. Five forms of environmental and physiological conditions tend to break

down the synaptic resistance correlated with unpleasant emotions: (1) intensity of stimulus, (2) repetition or insistence of stimuli or situations, (3) suddenness of the stimulus or the lack of proper bodily adjustment in terms of the cerebrospinal system, (4) blocking of the usual bodily responses, like those of food and sex, usually through social agencies, (5) state of visceral tonicity. He closed with a warning that all these factors are subject to elaboration, modification, and inhibition through the cortical areas representing experiences acquired during the lifetime of the individual. Here we find an analogue to the 'retroflex' theory of Troland and also to certain phases of the Cannon theory, which we shall soon consider.

Allport's theory is well summarized in the following passage:

"The craniosacral division of the autonomic, supplemented under certain conditions by the cerebrospinal system, innervates those responses whose return afferent impulses are associated with the conscious quality of pleasantness. The sympathetic division produces visceral responses which are represented in consciousness as unpleasantness. . . .

"We propose that the differentiating factor arises from the stimulation of the proprioceptors in the muscles, tendons, and joints of the somatic part of the organism; and that afferent impulses from these characteristic sensory complexes by which one emotion is distinguished from another of the same affective class."[1]

Our reaction is that the hypothesis is plausible, interesting, and unproved. It is not supported by direct experimental or pathological evidence. The cited instances are apt but, of course, like all resort to argument from specific cases, they might be regarded as being 'hand-picked.' More research should be forthcoming. It is to be regretted that this suggestive hypothesis has not come more to the notice of those who are engaged in neurological investigations of behavior.

Another theory which should be classed as having more to do with inherent environmental, sociological, and biological factors was proposed by Kantor.[2] It was supported in part by Howard[3] and others and stressed the interpretation of emotional behavior in terms of adaptive response. Kantor wished to eliminate from the emotions all utilitarian doctrines. After summarizing some of the other theories he proceeded to define the emotional situation in terms of a disruptive chaos which can obviously be avoided by the substitution of an overt response for one that is lacking. He did not favor too great an emphasis on the relation between the emotions of the lower animals and those

[1] F. H. Allport, *Social Psychology*, pp. 90–92, 1924.

[2] J. R. Kantor, An attempt toward a naturalistic description of emotion, I, *Psychol. Rev.*, 28, 1921, pp. 19–42; II, pp. 120–140.

[3] D. T. Howard, A functional theory of the emotions, *Feeling and Emotion: the Wittenburg Symposium* (ed. by Reymert), pp. 140–149, 1928.

of man, since such a use of the term 'emotion' confuses emotional reactions proper from other types of affective behavior. In other words

> . . . unlike any other type of behavior, the emotional reaction is not a positive response to a stimulus but rather a failure of a stimulus-response coördination to operate. What happens is that the organism is left in a crucial situation (in the most striking cases) without certain expected or desirable means of adaptation, either because of not having a response system for the particular stimulating circumstances or because of some failure of such an acquired response system to operate. Emotions are therefore essentially 'no response' activities.[1]

He divided the emotional situation into (1) the perceptual or cognitive phase, *i.e.*, the discrimination and apprehension of the stimulus, object, event, or situation, or its ideational equivalent; (2) the emotional response proper; (3) the superseding organic or other responses. Throughout, he laid much stress on the *disruptive chaos* as a definite means of distinction between emotions and other forms of behavior, but he also considered of equal weight a descriptive account of the complete experience and response mechanisms.

3. Modern Theories Based More Definitely on Experimental Work. Some of the recent theories of emotion just discussed involve to some extent research work done in the laboratory on the lower animals, on pathological human subjects, and on children. But the weight of this sort of evidence was only of minor consideration; the major emphasis was biological, neurological, and social. Now we approach the present through a more definite experimental growth, which has borne fairly definite fruit but is still not entirely free of misconceptions and bias. We return to our starting point with the James-Lange-Sergi theory, which in this year of writing still hovers about us like the ghost of an unrequited love. The reference to Dunlap's criticism, recently made, is an indication that the James-Lange-Sergi theory is still very much with us. Perhaps the review which Angell gave to the theory in the light of experimentation during the two decades that had elapsed since James's final word would be helpful.[2] Angell goes over the work of the English physiologist, Sherrington, and that of James's own colleague, Cannon, in their experiments upon the lower animals. He disagreed with Ladd and Woodworth in their rather strongly discrediting statements.[3] Sherrington transected the spinal cord in the lower cervical region on five young dogs, which operation cut off:

[1] *Op. cit.*, p. 138.

[2] *Op. cit.*, pp. 251–261.

[3] G. T. Ladd and R. S. Woodworth, *Elements of Physiological Psychology*, p. 525, 1911.

" . . . from the brain all nexus with the thoracic, abdominal and pelvic viscera, except that existing through certain cranial nerves. It also cuts off all the blood vessels from the bulbar vasomotor center, except for certain scanty communications through the cranial nerves. The skin and motor organs are, as far as the shoulder, likewise cut off from all communication with the brain. Therefore, behind that level they are precluded from contributing to nervous processes of emotion either in their centripetal or their centrifugal phases. . . . If reliance be placed on the signs that are usually taken to signify pleasure, anger, fear, disgust, then these animals showed them as unmistakably after as prior to the transection of the cervical spinal cord. . . . Toward friends and enemies among their fellow inmates of the animal house, they displayed as markedly as ever their liking or their rage. . . . I saw fear notably displayed by one of the dogs . . . The lowering of the head, the dejected half-averted face, and the drooped ears contributed to indicate the existence of an emotion as lively as the animal had ever shown us before the spinal operation had been made."[1]

A number of other experiments have been performed by this physiologist and as a result of this research he concluded:

"These experimental observations yield no support to the theories of the production of emotion quoted at the opening of this communication [James, Lange, Sergi]. On the contrary, I can not but think that they go some way toward negativing them. A vasomotor theory of the production of emotion seems at any rate rendered quite untenable. [This criticism was made to apply largely to Sergi and to some extent also to Lange.] I would not be thought to impugn the importance of the study of such organic phenomena in connection with emotional mental states. The only respect in which the here given observations affect the position of affairs is, that they, I think, render it necessary to attribute to these elements of emotion another significance than that imputed by the authorities quoted in my opening paragraph."[2]

Sherrington outlined three possibilities: "(1) that the psychic part of emotion arises first and its neural correlate then excites the viscera, (2) that the same stimulus concurrently excites the mind and the nervous centers controlling the viscera, (3) that the emotional stimulus acts first on the nervous centers controlling the viscera whose reaction, as we apprehend it, is the emotion." Sherrington subscribed to the first view, while the third view was Jamesonian.[3]

In answer we must agree with Angell (1) that not all the organic or postural movements were eliminated, since the connection between

[1] C. S. Sherrington, Experiments on the value of vascular and visceral factors for the genesis of emotion, *Proc. Royal Soc. of London*, 66, 1900, pp. 390–403.

[2] *Ibid.*, pp. 402–403.

[3] C. S. Sherrington, *Integrative Action of the Nervous System*, pp. 255–258, 1906.

the diaphragm and the brain was retained and since the description of the expressions used as evidence for the emotion involved many other important responses, and (2) that the only evidence of emotion which was and could be taken from the lower animals were the movements which Dewey had done so much towards distinguishing as 'organic feelings' from the experience of emotion itself. Only the importance of the vasomotor disturbances was really undermined, and (3) that since the question of a temporal sequence has arisen as the crucial distinction between the various theories, the answer can itself never reliably come from introspective or any other type of direct report from the observer, since the temporal values are of the order of a fraction of a second. As Angell pointed out, "In some instances the bodily reaction seems to come distinctly after the cognitive apprehension of the emotion-provoking stimulus; sometimes it seems to precede, sometimes to accompany."[1] It will be remembered that Lehmann's results showed that the experience of the feeling generally preceded the graphic evidence of bodily reaction—at least of the type which he recorded. Furthermore, as we have noted before, it appears quite impossible to leave cerebral activity other than purely sensory experience wholly out of the picture. In Angell's words, "On the whole it seems probable that in man practically all the emotions, even in their first exercise, implicate cerebral reflex arcs."[2]

We see, then, that interesting though these experiments have been, they throw discredit on extreme vasomotor theories and are neither conclusive in their own right nor damaging to James's point of view when we have only the questionable expressions as criteria of emotion.

We shall now pass on to Cannon, who has made a large number of experiments and has published a long list of articles on the subject of emotion.[3] He reacted to the James-Lange theory as follows:

"This coincidence of disturbances in muscles and viscera with thrills, excitements or depressions was naturally misleading, for, with the rôle of the thalamus omitted from consideration, the obvious inference was that the peculiar quality of the emotion arose from the peripheral changes. Indeed, that inference is the heart of the James-Lange theory. The evidence presented in the foregoing pages shows that the inference is ill-founded; the

[1] *Op. cit.*, p. 256.

[2] *Ibid.*, p. 256.

[3] W. B. Cannon, *Bodily Changes in Pain, Hunger, Fear and Rage*, 1915; The James-Lange theory of emotions: a critical examination and an alternative theory, *Amer. J. Psychol.*, 39, 1927 (Washburn Commem. Vol.), pp. 106–124; Neural organization for emotional expression, *Feeling and Emotions: The Wittenberg Symposium* (ed. by Reymert), 1927, pp. 257–269.

sensations from the peripheral changes, contrary to James' view, are "pale, colorless and destitute of emotional warmth," whereas the thalamic disturbances contribute glow and color to otherwise simply cognitive states. The theory now proposed explains how James and Lange could reasonably make the suggestion which they made. The lack of factual support for their suggestion requires another account of emotional origins. This is provided by the evidence that thalamic processes can add to sensation an aura of feeling."[1]

His argument rests primarily on the fact that in a variety of emotional situations he obtains the same sort of visceral response. "It is because the returns from the thoracic and abdominal 'sounding-board,' to use James's word, are very faint indeed, that they play such a minor rôle in the affective complex."[2] Angell's reply, speaking, as it were, in James's place, stressed two important factors which in spite of research up to that time still remained intact:

"(1) The hereditary basis of emotional reactions and, (2) the invariable re-percussion upon the cortex of these reflex effects in the muscles, glands, and viscera. . . . Phrase your doctrine so that these two great groups of facts are recognized and properly evaluated and you may call your theory Jamesian or not as you please. You will at least have accepted what lies at the root of James's theory."[3]

In later contributions on the basis of the extensive research done by him and his students, Cannon turned to the thalamus, a neural center just below the brain, as the distributing center of the emotional responses. He first repeated five arguments against the traditional theory of James: (1) total separation of the viscera from the central nervous system does not alter emotional behavior; (2) the same visceral changes occur in very different emotional states and in nonemotional states; (3) the viscera are relatively insensitive structures; (4) visceral changes are too slow to be a source of emotional feelings; and (5) artificial induction of the visceral changes typical of strong emotions does not produce them.

Constructively, he advanced two main arguments in favor of his theory: (1) emotional expression results from action of subcortical centers, (2) thalamic processes are a source of affective experiences. This evidence rests on experiments performed upon some of the lower animals but also on facts obtained from human individuals under the

[1] *Bodily Changes in Pain, Hunger, Fear and Rage*, p. 370, 1929.
[2] *Ibid.*, p. 358.
[3] *Op. cit.*, p. 261.

influence of laughing gas or in other forms of depression of cortical activity during acute alcoholism. The explicit statement of his theory is as follows:

"Within and near the thalamus the neurones concerned in an emotional expression lie close to the relay in the sensory path from the periphery to cortex. We may assume that when these neurones discharge in a particular combination, they not only innervate muscles and viscera but also excite afferent paths to the cortex by direct connection or by irradiation. The theory which naturally presents itself is that *the peculiar quality of the emotion is added to simple sensation when the thalamic processes are roused.*"[1]

Recently the James-Lange-Sergi theory has flared up again; first in a critical article written by Wheeler and his colleagues,[2] to which Cannon has categorically replied by way of defense.[3] Wheeler *et al.* proposed a defense of the James-Lange-Sergi theory of four counts: (1) that visceral, vasomotor, and other organic changes are necessary (but not sufficient) conditions for emotional experiences; (2) that movements and changes in tension of the voluntary musculature are contributing conditions; (3) that from the phenomenal standpoint, organic and kinaesthetic experiences are essential (but not sufficient) aspects of emotion; and (4) that the 'feeling tone' of emotion can be resolved into these organic and kinaesthetic processes, and consequently is conditioned by bodily changes.

They accused Cannon of inconsistency. In the case of decorticated cats the emotional expressions are used as criteria of bodily expressions, but in human subjects not the expressions but their verbal reports were taken as decisive. This sort of contradiction continues in other cases. On the point advanced by Cannon that organic changes lack sufficient specificity to account for the great variety of emotions, Wheeler *et al.* replied, that (1) emotions are becoming much more alike from the subjective angle than was formerly thought possible, that (2) postural changes are important factors in the affective life, that (3) aside from organic changes, the stimulus situation in many cases is still distinctly specific, and (4) that the 'reaction patterns' necessary for the thalamic theory are the very postural and organic factors which Cannon denied.

To the point raised concerning the insensitivity of the viscera they quote from his own article, "to the effect that *the result of adrenalin is a host of visceral experiences.*" We know also, not only from casual observation in normal life but from the experimental results of Boring, Carlson, and others, that the viscera respond to definite stimulation and afford sensory experience.[4]

[1] *Op. cit.*, *Amer. J. Psychol.*, 39, 1927, p. 120.

[2] E. B. Newman, F. T. Perkins, and R. H. Wheeler, Cannon's theory of emotion: a critique, *Psychol. Rev.*, 37, 1930, pp. 305–326.

[3] W B. Cannon, Again the James-Lange and the thalamic theories of emotion, *Psychol. Rev.*, 38, 1931, pp. 281–295.

[4] E. G. Boring, Sensations of the alimentary canal, *Amer. J. Psychol.*, 26, 1915, pp. 1–57, The thermal sensitivity of the stomach, *ibid.*, pp. 485-494; A. J. Carlson,

In connection with the temporal course of the emotion they answered that Cannon was unfair in the selection of reaction times. His claim was that it would take too long for the organic and kinaesthetic sensations to arrive back at the cortex in order to make them constitutive of emotions. The reaction times for both organic changes and smooth muscular reaction are no longer according to their figures than .85 second, whereas the time for an affective experience is taken to be .80 second. On the other hand they indicated that in some observations by Wells[1] the developing affective experience came only from three to fifteen seconds after the exposure of the material, with one observer as late as two to three minutes. They also cited numerous other instances showing a rather late arrival of the full emotion experience and point in conclusion to the latent period frequently observed in galvanometric and other expressive techniques. We may note here that the latent period lasted in our own experiments frequently until some time after the first clear report of the emotion.

After pointing out some systematic fallacies in regard to the psycho-physiological relation between felt emotion, on the one hand, and physiological functions, on the other, Wheeler *et al.* concluded that any translation of emotion into purely physiological functions is both inadequate and out of date. Even as regards the intrinsic physiological evidence pertaining to the thalamus itself, they could not agree that the thalamus is the seat of emotions. They would rather interpret the results to prove that "other processes probably of cortical origin contribute to the pattern of visceral action and consequently to the emotion." On the whole they summarized the situation by saying that the clinical evidence favoring the thalamus as the seat of emotion is inconclusive. As a positive contribution they stated that:

"Emotion is a function of a unified neuromuscular system. If visceral and postural factors are eliminated, there is not emotion; if the cortex is depressed, postural and organic changes may take place without emotion; when cortico-thalamic balance is disturbed, emotional experiences may be altered in various ways. Cortical, thalamic, organic, and peripheral conditions are all necessary. Of utmost importance is the interpretation of the situation, an insightful response which determines whether or not the emotional pattern will be complete, and therefore whether peripheral conditions shall function in emotion or in some non-emotional response. . . . The valuable work of Head, Cannon and others on the function of the thalamus is all the more, rather than the less, significant if we do not attempt to locate emotion in that particular part of the brain."[2]

This rather detailed article in addition to its own positive contributions brought forth perhaps the most explicit statement of the thalamic

Contributions to the physiology of the stomach, *Amer. J. Physiol.*, 31, 1913, pp. 151–175.

[1] F. L. Wells, Reactions to visual stimuli in affective settings, *J. Exper. Psychol.*, 8, 1925, p. 64.

[2] *Op. cit.*, p. 326.

theory in a matchless polemic by Cannon. The theory, now presented in schematic form, is worthy of record here (see Fig. 11). The term 'thalamus' is used to indicate not only the sensory stations in the

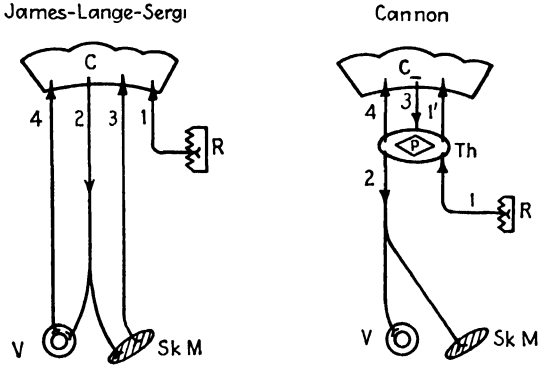


FIG. 11.—Schematic representation of the James-Lange-Sergi and the Cannon theories of emotion. *R*, receptor; *C*, cerebral cortex; *V*, viscus; *Sk M*, skeletal muscle; *Th*, thalamus; *P*, pattern. The connecting lines represent nerve paths, with the direction of impulses indicated in their order of sequence. Cortico-thalamic path 3 is inhibitory in function. (*Slightly modified from diagram by Cannon in Psychological Review*, 38, 1931, *p.* 282. *Courtesy of the author and the Psychological Review Company.*

various parts of the diencephalon, but also the motor centers in the hypothalamus (see Fig. 12). It was pointed out that all afferent paths except the olfactory are interrupted at this platform and that it has

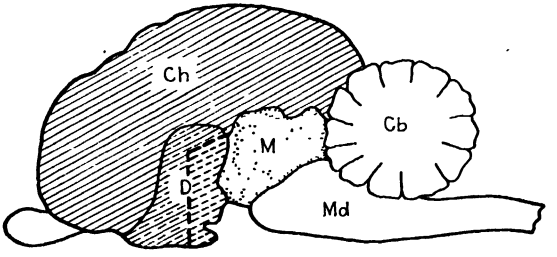


FIG. 12.—Diagram of the mid-section of the cat brain. *Ch*, cerebral hemispheres; *D*, diencephalon; *M*, mesencephalon; *Cb*, cerebellum; *Md*, medulla. The parts distinguished by slanting lines can be wholly removed without destroying the rage response. [*From W. B. Cannon, Neural Organization for Emotional Expression, Feeling and Emotion: the Wittenberg Symposium (ed. by Reymert), p.* 261, 1928. *Courtesy of the author and the Clark University Press.*]

been discovered to be a coordinating center for all so-called 'emotional' reactions. This is substantiated by the fact that (*a*) after the removal of the cerebrum anterior to the thalamus in the lower animals, the behavior commonly interpreted as rage is exhibited, but when the

thalamus is also removed this reaction disappears; (*b*) a tumor affecting one side of the thalamus in man results in unilateral laughter or the grimace of pain, under appropriate circumstances, although *cortical* control of the same muscles is bilateral; and (*c*) that temporary impairment of cortical control of lower centers in light anaesthesia or permanent impairment by disease releases free and often prolonged weeping or laughing. Two things are to be noted, that the typical modes of emotional expression are not directly governed by the cortex but "are directly dependent upon patterns of neurone organization in the thalamic region and that paths three and four occurring in the James-Lange diagram and representing the return sensations from the viscera and muscles are not represented in the figure for the thalamic theory, not because they do not exist but because their significance in the theory of emotion is in question. . . . "

A major point was made of the distinction between emotional behavior and emotional experience, which are inseparable in the James-Lange-Sergi theory but distinguishable in the Cannon thalamic theory, since the former is attributed to the thalamus, while the latter is referred to the cortex. This invalidates much of the criticism against the Cannon theory.

As regards the specificity of organic changes, comparable with the specificity of different emotions, Cannon replied that this is a matter of individual interpretation. He found great distinctions in emotions but small differences in the experiences of the distinguished physiologist, Bell, in which there was total facial paralysis without loss of motion in the tongue in a young girl who "sometimes laughed heartily . . . as if behind a mask; a face being quite immovable and grave whilst the emotion and sound of laughter prevailed."[1] In this case there was emotional feeling, he claimed, although the characteristic emotional response was largely lacking. In connection with the sensitivity of the *viscera* the matter hinges first of all on the definition of the term, since epigastric palpitation, arterial throbbing, and the like, are not usually included under the concept, and partly around the representation that not the viscera themselves but surrounding parts are supplied with sensory equipment.

The charge concerning the reaction time of visceral changes is met by the statement that to the values mentioned must be added the time for the muscles themselves to report back to the cortex. "In the case of issue," Cannon says, "after the latent period of .25 second, the contraction period required 5 or 6 seconds and the relaxation period still longer." He made the claim that the emotion itself could not rise until the peak of the spasm had been nearly approached or actually reached. The latent period for glands is, of course, much longer, ranging from 2 seconds to 6 minutes. In addition,

[1] C. Bell, *The Nervous System of the Human Body*, p. 178, 1833.

of course, there are extra neuronal pathways to be traced through the autonomic system. This period is not known but at any rate it is not negligible.

Cannon reiterated that while he sponsored the thalamic theory, he has nowhere stated that it is the 'seat' of the emotions since this phrase would imply the inclusion of both the experience component and of the behavior pattern. As the scheme clearly indicates, cortical inhibitory factors, as well as cortical elaborative factors, are fully provided for. Only the organization of inherited patterns is assigned to the thalamus as a governing neural mechanism.

As in the case of James, Cannon found later substantiation for his theory in a case reported by Dana, which is described as follows:

"The patient, a very intelligent woman of 40, had broken her neck at the third and fourth cervical level. She was paralyzed in all four limbs and lacked completely cutaneous and deep sensation from the neck down. 'She lived for nearly a year, and during that time I saw her showing emotions of grief, joy, displeasure and affection. There was no change in her personality or character. The only skeletal muscles at her command were the cranial, the upper cervical and the diaphragm. As for the vegetative nervous system, she had the vagus, but the vagus has no active (low-level) sensory fibres except the laryngeal. The parasympathetic system in this patient was able to function, but the sympathetic proper was absolutely eliminated from subconsciousness and consciousness. It is difficult to understand, on the peripheral theory, why there should have been no change in her emotionally, with the skeletal system practically eliminated and the sympathetic entirely so.' "[1]

He also referred to several other similar cases. Quoting from Wilson, he said:

"More than one patient has protested against the laughter of tears being taken as the index of his actual affective state. The conclusion is unmistakable, that the bodily reverberation, as James calls it, is not *per se* the emotion. . . . With all the outward appearances of mirth and hilariousness, and with concomitant activity of visceral mechanism, the individual may not only feel happy, but his state of mind may be in patent conflict with the apparent emotion."[2]

In conclusion Cannon stated that:

" . . . clinical observers, like the physiological experimenters, have been forced by the facts to turn away from the idea that emotions have a peripheral source. The thalamic theory offers an alternative view, and, as Cannon

[1] C. L. Dana, The anatomic seat of the emotions, a discussion of the James-Lange Theory, *Arch. Neur. & Psychiat.*, 6, 1921, p. 634.

[2] S. A. K. Wilson, *Modern Problems in Neurology*, p. 275, 1929.

explained in his account of that theory, it appears to be in accord with the facts now known."[1]

Another notable contribution comes from that eminent neurologist and physiologist, Crile, who is especially well known for the anaesthetic technique called anociassociation. Through prolonged study of the histological conditions of brain cells, he was convinced that the ordinary techniques involving general anaesthesia left the brain cells in a much disturbed and sometimes in a well-disintegrated condition. In connection with these investigations he has also studied such phenomena as emotion, fatigue, and pain. These studies and lectures on the subject were brought together in one volume.[2] His explanation of emotional phenomena is partly biological and partly neurological. Biologically he considered all animals, including man, as having three great functions: (1) self-defense against, or escape from, enemies, in short, fight or flight; (2) the acquisition of food; and (3) procreation. On the neurological side all the mechanisms involved provide discharges of energy for these fundamental functions. In the case of emotional situations with the strong component of withdrawal, the ultimate purpose is withdrawal from injury and the body is full of devices to accomplish this end; even tickling releases enormous amounts of energy in connection with those parts of the body that are particularly vulnerable. None of these mechanisms occur in animals that are anatomically well-protected against attack. The armadillo, which rolls itself into a ball for defense; the turtle, which is incased for the most part in an external skeleton; the skunk, which secretes an extremely unpleasant and penetrating odor; and the lion or tiger, which have an efficient muscular mechanism for defense—all these animals do not show either the extreme emotion of fear or the reactions normally following pain in connection with wounds. The skunks and armadillos could not easily be exhausted by trauma; the turtle, the armadillo, and the skunk also have fewer receptors for pain than has a dog or a man. But through minute examination of the brain cells of animals excessively frightened through continuous chasing, as in the case of a rabbit, it has been discovered that there is a hyperchromatic condition of the cells of the cerebellum during stimulation followed by a hypochromatic condition during the period of exhaustion. Fear is called a phylogenetic representation of trauma and leads to a variety of symptoms. Crile's theory is well described in the following quotation:

[1] *Psychol. Rev.*, 35, 1931, p. 295.

[2] G. W. Crile, *The Origin and Nature of the Emotions*, 1915

"On this mechanistic basis the emotions may be explained as activations of the entire motor mechanism for fighting, for escaping, for copulating. The sight of an enemy stimulates in the brain those patterns formed by the previ ous experiences of the individual with that enemy, and also the experiences of the race whenever an enemy had to be met and overcome. Each of these many brain patterns in turn activates that part of the body through which lies the path of its own adaptive response– those parts including the special energizing or activating organs. Laboratory experiments show that in an animal driven strongly by emotion the following changes may be seen: (1) a mobilization of the energy-giving compound in the brain-cells, evidenced by a primary increase of the Nissl substance and a later disappearance of this substance and the deterioration of the cells; (2) increased output of adrenalin (Cannon), of the thyroid secretion, of glycogen, and an increase of the power of oxidation in the muscles; (3) accelerated circulation and respiration with increased body temperature; (4) altered metabolism. All these are adaptations to increase the motor efficiency of the mechanism. In addition, we find an inhibition of the functions of every organ and tissue that consumes energy, but does not contribute directly to motor efficiency. The mouth becomes dry; the gastric and pancreatic secretions are lessened or are completely inhibited; peristaltic action stops. The obvious purpose of all these activations and inhibitions is to mass every atom of energy upon the muscles that are conducting the defense or attack.

"So strong is the influence of phylogenetic experience that though an enemy to-day may not be met by actual physical attack, yet the decks are cleared for action, as it were, and the weapons made ready, the body as a result being shaken and exhausted. The type of emotion is plainly declared by the activation of the muscles which would be used if the appropriate physical action were consummated. In anger the teeth are set, the fists are clenched, the posture is rigid; in fear the muscles collapse, the joints tremble, and the running mechanism is activated for flight; in sexual excitement the mimicry is as obvious. The emotions, then, are the preparations for phylogenetic activities. If the activities are consummated, the fuel—glycogen—and the activating secretions from the thyroid, the adrenals, the hypophysis, are consumed. In the activation without action, these products must be eliminated as waste products and so a heavy strain is put upon the organs of elimination. It is obvious that the body under emotion might be clarified by active muscular exercise, but the subject of the emotion is so strongly integrated thereby that it is difficult for him to engage in diverting, clarifying exertion. The person in anger does not want to be saved from the ill effects of his own emotion; he wants only to fight; the person in fear wants only to escape; the person under sexual excitement wants only possession."[1]

On the whole, while Crile in his theory emphasized the action of emotions on the brain cells, especially the Purkinje cells in the cerebellum, he included a widespread mechanism that has been phylogenetically

[1] *Ibid.*, pp. 138–139.

associated and is emphasized in certain diseases like exophthalmic goiter. He concluded with a concise definition of emotion:

"When our progenitors came in contact with any exciting element in their environment, action ensued then and there. There was much action—little restraint or emotion. Civilized man is really in auto-captivity. He is subjected to innumerable stimulations, but custom and convention frequently prevent physical action. When these stimulations are sufficiently strong but no action ensues, the reaction constitutes an emotion. A phylogenetic fight is anger; a phylogenetic flight is fear; a phylogenetic copulation is sexual love, and so one finds in this conception an underlying principle which may be the key to an understanding of the emotions and of certain diseases."[1]

Another theory which arose out of the context of the James-Lange-Sergi theory is that of Marston, who has been working for many years on the problem of relating systolic blood pressures to emotion and affection. While curves of systolic blood pressure are exceedingly sensitive indicators of emotion, their very complexity makes them somewhat difficult to interpret.[2] We are postponing more specific discussions of the expressive techniques for consideration in a later chapter, therefore only the theoretical positions here advanced will concern us. Marston started out with an attack, not on sensory interpretation of emotion in the James-Lange-Sergi formula, but on the motor component—such as running away in fear or striking in anger. Not the motor response itself but its success or failure as consciously recognized spells anger or fear respectively. In both cases the emotion springs from conflict but in the case of fear the central generic source is the *appetitive* impulse seeking self-enlargement, which, when passively unsuccessful, arouses fear; when actively unsuccessful, it produces shame; when passively successful, it gives triumphant elation; and when actively successful it stimulates a triumphant emotion. In a similar scheme where the central generic source is the *sex response* seeking self-depletion, jealousy holds its position as a passively unsuccessful experience; anger springs from an actively unsuccessful impulse; passion arises from a passively successful motor response; and love from an actively successful reaction.

The same notion of conflict was carried over in the explanation of pleasantness and unpleasantness in the affective processes, which together with cognitive and motor elements constitute the emotion. Pleasantness is at its core the feeling of 'well-being' which is defined as "a cumulative, harmoni-

[1] *Ibid.*, p. 76.

[2] W. M. Marston, A theory of emotions and affection based upon systolic blood pressure studies, *Amer. J. Psychol.*, 35, 1924, pp. 469–506.

ous, sensory awareness accompanying allied discharge of sensory impulses of insufficient intensity to pass the lower thalamic threshold of sensation." In terms of pleasantness itself the suggestion was made that "the passing of any subminimal sensory impulse to unimpeded motor discharge, over any thalamic nerve path correlated with consciousness, is accompanied by the feeling of pleasantness." Contrariwise, "unpleasantness is correlated with unrelieved, thalamic, summation of sensory impulses, in the sensory circuits of the unsuccessful competing impulses," which result in a "motor antagonism between impulses or groups of impulses seeking outlet over a common efferent path."

Curiously enough there was not any direct discussion of the rôle which systolic blood pressure plays in this mechanism. The inference is that it reflects the situation at the thalamus, where presumably blocking or unimpeded response takes place. From the researches involving decerebration and decortation it is apparent that the blocking, regulation, and modification of impulses are more adequately relegated to the cerebrum, which must also be the correlate both of the consciously felt emotion and of the affective qualities. Thus we are not much farther along in our mechanics of emotion than we were before, because the factor of conflict and of smooth functioning of impulses has been stressed many times before as criteria of the two large types of emotion. The main contribution from Marston would then seem to be his derivation of emotion from two essential drives; food and sex. At one time or another these two primitive impulses have also been woven into the fabric of other theories.

In view of the widespread 'expressive' effect of what we called the 'affectivities,' which in our reading is equivalent to the phrase, affective life, Cason has proposed a theory that involves "organic patterns of interacting activities." Many different kinds of processes are simultaneously included but not always to the same degree of intensity. He listed physical, chemical, neurological, endocrinological, visceral, sensory, muscular, conscious, and unconscious factors. The complexity of the pattern is due to the mutually interacting nature of the various factors. He would therefore take account of as many as can be scientifically scrutinized, thus allowing for both physiological records and introspective reports. Furthermore, since each factor has its own temporal course, he would regard as important the noting of various overlappings. No linear concatenation of these factors is adequate.

We agree with this representation of the facts but should like to indicate that, for purposes of scientific analysis, one or more of these factors must be segregated at a time to obtain unequivocal and controlled results. Later the entire texture of the complex phenomenon may be viewed as an integrated whole, when the operations of the separate factors are more clearly understood. Certainly the problem is not more complex than many others which

face us in the organic world. We are mainly cautioned against the absurdities of abstraction and isolation discussed in the opening section of Chapter IV. The complicated nature of the affective life is also thrown into high relief through the requirements of the phylogenetic theory. Since the affective process is the oldest conscious process, it has seized upon each physiological process that has progressively appeared in the course of individuation. The potential interplay of all of these mental and physical factors is consequently to be expected.[1]

4. Critique and Review.—At this point a constructive critique and review is in order. Having gone over these various theories in detail we ask what is the present outcome and outlook? Without assuming either the ability to telescope the important contributions of the Wittenburg Symposium into a few paragraphs or the competency to advance a single theory as potent or as provocative in thought and research as was the James-Lange-Sergi theory, we must at least make some sort of positive statement. Our present neurological knowledge, the more definite delimitation of psychological terms available today, and the long series of experimental results, which should crystallize thought rather than confuse it, invite a new frame for the picture of emotions as we have it. The picture has been sketched and resketched, numerous details have been added from time to time, and the final touches, more clearly defining the foreground and background, have brought it into high relief.

In the first place, what used to be a single portrayal of the emotions in general is now replaced by several delineations of types of processes in the affective life. Emotion is only one, as Kantor rightly remarks, of several members of the family. Next to it stand portraits of simple feeling, sense feeling, passion, mood, sentiment, and the like. The whole of the affective life is now a family of relatives. If we examine the portrait of emotion separately, we find that it may be called by many names, like fear, rage, hope, love, and joy. There is a likelihood that the names will contain more unpleasant items, as Bentley and Howard have noticed, than pleasant ones. Bentley generalizes thus:

"The term 'predicament' seems to suggest that emotions are always unpleasant. Most of them are. Take a representative list of them: anger, rage, fear, pity, resentment, jealousy, envy, grief, hope, hate, despair, joy, remorse, shame, disgust, relief, lust, anxiety, disappointment. Only hope, joy, relief, lust, and certain forms of anger suggest agreeableness and pleasure. Of these we may say that relief is but the agreeable resolution of emotions unpleasant in their earlier stages, *i.e.*, anxiety, fear and despair; that anger

[1] H. Cason, An interacting-pattern theory of the affectivities, *Psychol. Rev.*, 40, 1933, pp. 282–291.

is pleasant only when it is in process of resolution, and that hope is only hope when the predicament presents unpleasant possibilities. We are left with joy and lust. From joy we must subtract the joyful and playful moods (without predicament) and the joyful resolutions of a wide variety of unpleasant predicaments (the most frequent joys); and from sexual and amative emotions those frustrated forms which are distinctly unpleasant. We are still left with the real stir of desire before its object and the joy which inheres in a really 'joyful' situation. But it may be doubted whether joy is a real emotion. There are joyful occasions. But are there joyful predicaments? Shand argues for a kind of predicament of 'end' in joy, an end which he finds in the effort to maintain the joyful occasion, 'to conserve the existing situation,' to prevent it from lapsing; but it is doubtful whether this is an inherent part of joy itself. Where joy is not a case of exuberant spirits, a mood sustained by agreeable apprehensions, it appears essentially to rest upon unimpeded action and accomplishment, as in play, exercise and the dance."[1]

Somewhat in the same vein Howard says:

"Therefore, I went through the list of emotions to see how many are disagreeable and how many are pleasant and agreeable and I found the describers give a very large number of disagreeable and unpleasant emotions, and a few agreeable."[2]

On the other hand in a daily account of his feelings which H. Münsterberg kept for nine months in the course of his ordinary everyday life, he noted twenty-seven lively unpleasant feelings and fifty-one strong pleasant ones.[3]

Nevertheless, just because the relatives have been given separate names, the common parent, emotion, has fewer designations than in the traditional lists. Of course, it is still a somewhat composite portrait, in the same sense that we might paint a portrait of a Connecticut Yankee or of a southern gentleman to represent their respective groups.

Carr quite significantly points out in this connection that the psychophysical processes involved in emotion are divisible into three categories: (1) the act accompanying the emotion, such as flight in the case of fear; (2) the experienced feeling, which he calls the emotion itself; and (3) the expression of the emotion, which requires an outside observer who notes the expres-

[1] *Op. cit.*, p. 311. Bentley's argument may here seem to beg the question when he asks, "Are there joyful predicaments?" How can there be if, as he states at the beginning of the quotation, the term 'predicament' itself connotes unpleasant emotions! Predicament is, of course, a functional and teleological concept. As suggested later, this difficulty may be, if necessary, circumvented by stressing mainly the *suddenness* in the arrival of the new situation or object.

[2] *Op. cit.*, p. 149.

[3] H. Münsterberg, *Beiträge zur experimentellen Psychologie*, Pt. 4, p. 218, 1892.

sion.[1] This separation should clear up, at least from the point of view of experience, those contentions that presuppose the expression to be equivalent to the emotion, and it should also remind us of the teleology which, as Dewey has once and for all pointed out, lies behind the term 'expression.' But from the strictly psychophysical point of view, or, better, from the psychophysiological angle, the overt actions of flight, fight and the rest, which McDougall also separates as instinctive phases of the various emotions, are so inextricably bound up with the implicit responses of the entire body that it would be technically difficult, if not impossible, to draw the line of demarcation between *acts* and *expressions*. If we follow the integrative actions of the entire neuromuscular and the neuroglandular systems and the interaction of these two systems, we have no dichotomy left but the experience and the bodily responses, which also, in a real sense, mutually correspond. If James has done us a service, it has been to emphasize the sensitivity to bodily components as an integral part of the emotion and to press his argument through the discussion of 'body-less' emotions and anaesthetized cases. Gardiner has shown the weakness of this argument, but at most the point of conscious reverberations and the like can not at this stage be entirely given up.

Carr has advocated a judgmental concept of pleasantness and unpleasantness. These qualities then become "attributes which we subscribe to any stimulating situation in virtue of our normal reaction tendency toward it." Such reactions may be based upon the normal effects expected from typical situations. The type of reactions, whether positive or negative in terms of seeking or avoiding the object or situation, does not always signify whether that situation or object is pleasant or unpleasant. Here a conative judgment may supervene upon the original affective judgment since, in terms of experience, such objects and situations may acquire a meaning different from the normal type. The affective judgment indicates "how the object affects the subject" while the conative judgment indicates "the reactive attitude of the subject toward the object as a goal of action."[2] Peters has recently critically reviewed this theory in the light of theoretical and experimental studies on the subject. He believes that this theory "fits the facts of feeling as a functional process and reveals the true nature of the paramount problems."[3]

Unless we are confronted with a type of 'act' psychology like that of the Austrian school best represented by Stumpf, we can not easily fit such a theory into any genetic scheme. Even with the wide possibilities given to the term 'judgment' in Pillsbury's *Psychology of Reasoning*, it seems to the writer quite impossible to broaden the concept of judgment to include a variety

[1] H. Carr, The relation between emotion and its expression, *Psychol. Rev.*, 24, 1917, pp. 369–375.

[2] H. A. Carr, *Psychology: A Study of Mental Activity*, pp. 290–293, 1925.

[3] H. N. Peters, The judgmental theory of pleasantness and unpleasantness. *Psychol. Rev.*, 42, 1935, pp. 354–386.

of mental processes. In a genetic scheme, either judgments would have to be assigned to the lowest types of animal organisms, or else we would have to deny them the right to experience pleasantness and unpleasantness as essential, bare qualities. Types of responses are correlated but they vary greatly in pattern and complexity, whereas pleasantness and unpleasantness remain as distinguishable as are red and green. Little seems to be gained by dubbing them judgments.

From quite another angle, the *acts* attending an emotion are also a part of the *expressive* picture to the beholder, and again the line of demarcation can not be definitely drawn. Rudolph has shown how much the audience is impressed with the acts involved in gait, gestures, and grimaces of the actor in the interpretation or *expression* of the emotion depicted. With these go also, of course, whatever other reflex evidences, such as blushing, paling, quivering, tone of vocal utterance, and the like, that can be detected by the audience. It is well to separate, however, the clearly mental side of the emotion as experience and the plainly social aspect of emotion as expression.

We would, therefore, say that the emotion has both a bodily aspect and a mental phase. In terms of body, we would sketch in the numerous complicated involuntary visceral and thoracic responses and the movements of the voluntary muscles. Glandular responses, both of the ductless and of the secretory sort, would also have an important place in our picture. In fact, no mechanism of the body, however minute, or any general aspect of bodily conditions as a whole, like the changes in the total metabolism or the histological condition of various kinds of cytoplasm or the action of autacoids, hormones, enzymes, and the like could be left out in a thoroughgoing envisagement from this angle. These mechanisms should be given a hereditary pattern, phylogenetically developed, which pattern would probably correspond to some neural predisposition and integrating mechanism in a lower brain center, like the thalamus and hypothalamus in the diencephalon.

These neural discharges would also indirectly involve the cerebrum and pass out over the several branches of the central, sympathetic, and the autonomic system. We shall have to accept Cannon's modification of the theory that the original sensory impulses, with the exception of the olfactory, pass first of all through the thalamic region, whence they incite discharges, both upward to the higher cerebral centers, where more involved complications originate, and downward toward the viscera and skeletal muscles, where profound changes may take place. Clearly the cerebrum acts both as an inhibitor, regulating the violence of the discharge and normally reducing the violence, and as the station where conscious factors may be superimposed as additional regulatory factors in subsequent reactions based

upon 'experience' and meaning. On the strictly mental side the emotional responses by definition would always be of the order of perceptual or ideational cognition of meaningful objects or circumstances.

In no case, therefore, at this level of the affective life could the cerebrum be left out, and the results of pain or injury inflicted under anaesthesia consequently could not be considered as emotional in the psychological sense of the term. There has to be an awareness of a predicament, using Bentley's term, of some sort, even though it is only vaguely cognized at the start. It is quite likely, on the other hand, that the more immediate patterning of response, since it has occurred so early in phylogenetic history, would by this time be relegated to some lower center like the thalamus. Then, too, the influence of education and the sanctions of civilization would naturally have to become effective through the cerebrum or possibly the cerebellum. We have then a neurological situation which is clearly complex. The body is once more a 'sounding board' but probably not in the sense that James wanted it to be. No manifestation when once it is accessible through suitable technique should fail to show some relationship with the experience called emotion from the psychological point of view.

The temporal sequence of events is not of tremendous importance by way of generalization. The service which James did us was to indicate for all time that emotions may come in, as it were, by the back door. Certain bodily manifestations, even general postures, have much to do in providing a setting for certain emotions and probably for many of the moods. If you ever have been downcast, 'blue,' and despondent, taking deep breaths, throwing the head back and looking the world in the face, whistling a merry tune while walking briskly, will very likely change your mood profoundly, or, at any rate, greatly modify your present disposition. If you take yourself violently in hand, grief may thus be changed into joy; contrariwise, take any friend who wishes to try the experiment, put him on his knees with head bowed, remind him of some serious fault or misdeed, talking to him the while in a condescending tone, and you can frequently produce a contrite spirit and an humble attitude. Probably no one can pray with due humility and reverence standing erect with the head thrown back and the chest out. Similarly, there have been many studies recently made with the effect of drugs which produce not only hallucinatory symptoms but profound affective changes.

But then this is only half or perhaps one-third of the picture. Indigestion, palpitation, irregular breathing, and a host of glandular results may be produced by merely thinking of the life led by wayward children or by squatters in packing-box huts along rubbish-strewn

river banks in many of our larger cities. At no turn of the road is the mind deprived of the companionship of the body. The entire spectrum of human and animal life on this earth reflects a psychophysical, or better, a psychophysiological partnership.

This is probably more profoundly true of the emotions, which have enjoyed a long and intimate companionship with the body in the history of the race. The temporal sequence then is not systematically of importance except that all forms of it are a possibility. (1) The body may respond first and the emotional or affective experience may follow (James-Lange-Sergi); (2) the two events, physiological and mental life, may be practically simultaneous; (3) or the emotional experience may occur relatively first and the bodily reactions and reverberations come in rapid succession (Sherrington). With temporal values between the mental and physical events reduced to a minimum of a fraction of a second, it is inconceivable in terms of our present observational technique to make absolutely certain which came first. The separation of events which James, Lange, Sergi, and Sherrington postulated were more matters of systematic disjunction than points in a serial order of temporal occurrence.

As to whether emotional behavior with its concomitant affective experience is to be described as a disruptive chaos or not, we have no pronounced conviction. Certainly typical emotions are disruptive in the sense that they suddenly intrude into a course of consciousness and a pattern of response that has been smooth and well adjusted through habit. But emotion in its biological history has been connected with emergencies. In this sense it intrudes and disrupts. The ordinary routine of the day is going along in well-regulated form when suddenly there is a crash and a window has been broken, or we smell smoke and rubbish is burning or electric wires have become short-circuited, or we hear a loud noise and someone has tripped on a rug and pulled over some furniture. An emergency of some sort has occurred and the customary machinery is suspended to take care of this unusual event. Likewise, an animal is happily grazing or hunting for food when a movement is seen in the brush or an unusual noise occurs and the animal has to adjust himself suddenly to a new situation that may be of tremendous importance.

If the perception is easily assimilated, or has been experienced so many times before that the responses are matters of frequent adjustment, there is no emotion; but if the cognition is one to which the learned and inherited responses have not been frequently adjusted, then apparatus, which may be present but not used so frequently, may be called for. The intensity of the seizure then is in proportion to its unusualness, and the more complete the seizure, the deeper down

will it go into racially associated mechanisms. Again, the seizure must be both mental and physiological. No emotion can be complete without the physiological component because so much of its history has been biological and of prolonged development. This is our reaction to the Kantor thesis. We should disagree that the adjustment is imperfect. It is only chaos as contrasted with the cosmos of ordinary routine living.

But the adjustments to these extraordinary situations show signs of functional serviceability certainly at sometime in our phylogenetic history. Whenever teleology is woven into the argument, we should scrutinize carefully what 'ends' are assumed. The purpose or aim is one which has to be variously conceived from various angles. To disrupt the smooth course of regular events is a highly important function when the irregular event appears. The emotional experience favors this irregular event by giving it undivided and high-pitched attention. That the emotions do not always fit into a civilized scheme is due to their unsuitable adaptability and their ancient history. Civilization is after all only a crust or veneer, with its greatest potency lying in its recency, not in its long history. But since the cortical areas do enter the picture, modifications may supervene over the patterns imposed on the lower centers through racial influences.

Here, then, we have emotion as we conceive it. It is no startling new proposition—it is a compromise. But from the angle of both neurology and psychology of the present day it seems to us, at least, plausible.

5. Summary.—In addition to the critique and review, a brief summary of the main points raised in the chapter may be helpful. The minor criticisms and modifications attacked the Jamesonian formula at various points: the logic of the argument, the conception of the stimulus which reflexly aroused the emotion, and the omission of the affective tone. James attempted a reply but in so doing subtracted much of the glamour of the theory and also its fundamental systematic position. The counterproposals tried to salvage that which was valuable and to add interpretations that were new and constructive. Darwin's three great principles were reviewed and illustrated; they were named the principle of serviceable associated habits, that of antithesis, and that of the direct action of the nervous system.

Dewey tried to make peace between Darwin and James by claiming that pleasant emotions result from frictionless neural energy and unpleasant ones from opposing lines of activity. In short, emotion springs directly from the mode of activity: just the reverse of the Darwinian hypothesis, thus somewhat agreeing with James. But in the

Dewey system behavior is an important item and determines the perception in the first place. It primarily defines and constitutes the emotion. The real contribution here rests on the distinction between James's organic *feeling* and Dewey's mental *being* emotional. Dewey added also a cautioning statement that not all organic reactions of a congenital nature are truly emotional.

Allport then proceeded to give feeling and emotion a more adequate setting by attempting to correlate the affective determinant of emotion with the two great branches of the autonomic nervous system—pleasantness with the smooth functioning of the craniosacral branch in the primordial impulses toward food and sexual objects, and unpleasantness with the inhibitory functions of the sympathetic branch, which in addition reacts on the circulatory and muscular systems sometimes, in the latter case, through the agency of autocoids. The descriptive distinctions between the different kinds of emotions depend upon the organic and kinaesthetic response pattern. Kantor remonstrated against the so-called utilitarian interpretations which stressed the usefulness of the emotional response and emphasized, on the contrary, the 'no-response' character of emotion. Emotions are distinguished from all other modes of behavior through the *disruptive chaos* which describes both the environmental and the bodily situation. On the other hand, emotion is still a conscious affair in so far as the organism becomes aware of this confused condition.

We then turned to theories that leaned more heavily on experimental procedures and on clinical studies. Angell summarized much of this earlier work. He pointed out that while emotional expressions can undoubtedly be traced to neural centers below the cerebrum, in the transection experiments not all organic or postural movements were eliminated, especially not those about the head. The evidence for the presence of emotion could not be introspective but should at the same time not be exclusively dependent on mere expressive movements. The temporal order of events was likewise not conclusively determined, nor was it of such major importance as James had suggested. The place of visceral disturbances in the general context of emotional phenomena was not disputed and this was a permanent contribution to the so-called 'discharge' theory of James.

Cannon sponsored the 'thalamic' theory, naming the thalamus or subthalamus as the principal distributing center for the emotional impulses. Wheeler *et al.*, in favoring a modified form of the James-Lange theory, found flaws in the Cannon argument, but generally failed to alter the fundamental neurological concepts. Crile worked out a phylogenetic theory which carried the story farther into the realm of

the cells of the cerebellum and showed deterioration in these cells when normal impulsive action is blocked; this results in emotional behavior. Marston reverts to the two important drives of food and sex for the primary sources of emotion. The oft-mentioned principle of conflict was made the basis for the affective qualities of pleasantness and unpleasantness, but the significance of the thalamus as the focal point where this might occur was not denied.

Taken all together, as was indicated in the critique and review, we are much better off today both for the impetus which the celebrated James-Lange-Sergi theory has given thought and experimental work on the emotions and for the research work itself, which has clarified but not entirely settled the issue. So much of importance has been taken out of the original Jamesonian statements that only the mere insistence on the visceral reaction, as an essential but not an equivalent component of emotion, is left. In the meantime the way has been cleared for a detailed discussion, first of all, of the grosser facial expressions and then of the more refined expressive techniques. This will occupy us in the succeeding chapters.

Review Questions

1. How did James meet the criticism that the way in which the object was perceived had much to do with the emotion aroused?
2. Name and explain the three fundamental principles which Darwin applied to emotional expressions
3. Enlarge upon Dewey's criticism of the term 'expression.'
4. What was Dewey's principal criticism of the Darwinian formula; would it be accurate to describe Dewey's position in terms of the phrase, "the expression is the emotion"?
5. Outline Allport's position in making a distinction between the neural correlate for affective quality and that for the emotional experience
6. Describe all the theories that rely upon 'blocked behavior' for their partial or ultimate explanation.
7. What is the outcome of the principle of temporal order of events in the Jamesonian version of the theory, as interpreted by Angell and others?
8. Cite the authorities which directly or indirectly support the thalamic theory
9. What two fundamental impulses have, according to several sources, furnished the basis of emotional impulses?
10. State in your own words the present outlook in regard to the James-Lange-Sergi theory of emotion.

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CHAPTER VIII

A PHYLOGENETIC THEORY OF AFFECTIVE LIFE

Whatever arguments can be brought to the support of Evolution generally, will count in favour of its being applied in the present case. We cannot exempt from the operation of the principle so important an organ as the brain; and with development of the brain proceeds, *pari passu*, development of the mind

A. Bain, *The Emotions and the Will.*

1. Plausibility of a Developmental Approach.—Many of the theories of the affective life have been genetic either in whole or in part, even in their oldest forms. As we have seen in previous chapters the affections have had much to do in explaining the development of the human mind or in adapting the organism to its environment. This fact in itself fortifies in two respects the theory that will be proposed in this chapter. First of all, it makes a genetic approach in principle more plausible as indicating the direction which all theories should take and, secondly, it justifies the attempt to build up from the place where other theories left off. Somewhere in *The Friend* Samuel Coleridge says, "The dwarf sees farther than the giant when he has the giant's shoulders to mount on." Thus in many ways we are now at a decided advantage in building up a theory that matches in general architecture most of the theories which have preceded this one, namely, in its genetic approach. The brilliant thinkers who have matched their wits with this problem have furnished not only the foundation but several stories to the building which we hope to erect.

Höffding, the great Danish psychologist, discusses this type of genetic primacy for feeling at length and subscribes to it with reservations. He criticizes Horwicz, Lewes, and Spencer for taking the view that all other types of consciousness have been derived from the affective process as a basis on two grounds: (1) when movements are first made motor sensations must immediately result, (2) pleasantness and unpleasantness in themselves would be of little avail unless a distinction could be made concerning the character of the stimulation and the kind and direction of the resultant movement.[1] To this the present writer would reply in answer to (1) that even if movement is present in the protoplasmic tissue of single-celled animals, no 'motor' sensations as such in our present sense could be or need be present. The tissue itself would be retracted, which would simply tend to put

[1] H. Höffding, *op. cit.*, pp. 96 ff.

an end to the unpleasant situation, or it would be stretched farther in response to satisfactory and comfortable conditions within the cell without the necessity of intermediary kinaesthetic factors. In answer to (2) one might remember that this statement again involves too high an order of interpretation. Realizing the tremendous mortality that takes place, efficient responses would very gradually win out. The simplest movements would be more like those of attraction and repulsion of electricochemical phenomena than those of highly organized animals. Nevertheless, Höffding does "start with the assertion that the feeling of pleasure and pain is present in the most primitive mental states, and is presupposed before definite and clear sensation." Therefore he can not define feeling "as the effect of sensations and ideas on consciousness. . . . As primitive conscious element, feeling is already given." General and motor sensations may however be present and a cognitive noting of differences in the strength and periodicity of the feelings may be presumed.[1]

Notably Spencer, Bain, and Ribot, as we have seen, have pointed out that the affections have had much to do with the gradual building up of mental processes and with the general welfare of the organism. In one of the earliest studies of the child mind Preyer explicitly stated the primacy of the feelings in the genetic life of the human infant.

"Little as is known thus far of the emotions and feelings of the young child, one thing may, however, be declared as certain—that these are the first of all psychical events to appear with definiteness, and that they determine the behavior of the child. Before a sure sign of will, of memory, judgment, inference, in the proper sense, is found the feelings have expressed themselves in direct connection with the first excitations of the nerves of sense, and before the sensations belonging to the special departments of sense can be clearly distinguished as specifically different."[2]

It is clear, therefore, that more than any other mental process the affections may plausibly occupy a primordial position in the whole of the mental life. Even the historical confusion in their systematic treatment, which we have cited, concedes this point. Take, for example, the original ambiguity of the word 'feeling,' meaning as it does in Spencer and James, general awareness or consciousness. Not even our words originally, therefore, separated the affective processes from consciousness itself. Take again the qualitative names which were attached in the early days to the life of feeling, namely, pleasure or pain. Pleasure may be retained with its opposite unpleasure, but 'pain' is no longer used because it now appears in our list of sensations, although it has not yet been assigned to any specific sense receptor. It has the distinction, however, of being related to all other sense

[1] *Ibid.*, pp. 233–234.

[2] W. Preyer, *The Mind of the Child. Pt. I: The Senses and the Will* (trans. by Brown), 2d ed., p. 185, 1884.

receptors when they are very strongly stimulated. As we shall see, even this anomalous position of pain plays into our hands. Pain has lost its status as a partner to pleasure, but at the same time it has apparently not yet attained full status as a specific sensory phenomenon, save perhaps among the cutaneous sensations. The experience of pain is also quite liberally localized in all other parts of the body.

Pain apparently, then, is the 'wandering Jew' of our sensory experience. But its inherently migratory nature is the very thing to expect by way of a genetic theory and by way of the principle of abstraction which we have dealt with in the opening section of Chapter IV.

We have already indicated the possibility that all mental processes did not begin at the same time. This is equally true in a restricted sense of the elementary processes. Some of these must have appeared earlier than others. Let us follow then a plausible sequence of events from the lowest form of animals to the present.

2. Foundations of the Phylogenetic Theory.—We shall assume that, when consciousness began in its vaguest form, it came in with the unicellular forms. We need not argue here what the precise species was because in general there is enough uncertainty as to which are the first animal forms to be distinguished from vegetable life, but for the sake of an instance we might speak of amoeba and paramecia as definite animal forms in which a simple awareness may be posited. There is, of course, no specialized nervous system as such and no sensory apparatus in these forms. But since in our theory affection requires no such apparatus, we might say that there is a general feeling of comfort or discomfort. This is similar to what Ribot calls 'vital or organic sensibility'.[1] E. Haeckel likewise makes a useful distinction of five chief stages of sensibility:[2]

"I. The whole psychoplasm is sensitive.

"II. *Sense-organs* begin to appear with primitive protoplasmic filaments and pigment-spots.

"III. *Specific organs* of sense arise by differentiation of these with separate functions that are not integrated.

"IV. Concentration is achieved through *centralization* and integration of the *nervous system.*

"V. *Conscious perception* is achieved through concentration in the central part of the nervous system."

Chemical, thermal, and mechanical stimulation is responded to in terms of a general algedonic tone.[3] Since movement is present and

[1] *Op. cit.*, p. 6.

[2] E. Haeckel, *The Riddle of the Universe* (trans. by McCabe), p. 110, 1900.

[3] This is a term coined by Marshall about four decades ago to express what used

learning has been found to take place at least in the paramecia[1] but probably also in amoeba,[2] this algedonic tone is soon connected with the motor apparatus. Romanes, Morgan, Loeb, and several other investigators in this field are ready to accept learning as evidence for the presence of mind. The last specifically concludes that the whole of the animal kingdom possesses consciousness.[3]

We shall assume, then, that the vaguest form of pleasantness and unpleasantness comprises the whole of the earliest types of consciousness and awareness. So far we have not made any improvement over Ribot, who also postulates this origin.[4] But now there appears a new principle, which we borrow from the biological work of Coghill.[5] After some thirty years of experimental work on amblystoma he has empha-

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to be called 'hedonic tone.' It is significant to note that Marshall makes affection an attributive process or 'quality' in relation to elementary processes of the mental life. (H R. Marshall, *Pain, Pleasure, and Aesthetics*, 1894). "Each elementary presentation must display either agreeableness or disagreeableness, or else indifference which is a mode of transition between the other two." (H. R. Marshall, The methods of the naturalist and psychologist, Presidential Address, *Psychol. Rev.*, 15, 1908, p. 16).

[1] L. M. Day and M. Bentley, A note on learning in Paramecium, *J. Animal Behav.*, 1, 1911, pp. 67–73; S. Smith, The limits of educability in Paramecium, *J. Compar. Neur. & Psychol.*, 18, 1908, pp. 499–510.

[2] H. S. Jennings, *Behavior of the Lower Organisms*, p. 24, 1906; *v.* D. Gibbs and O. P. Dillinger, The Daily life of Amoeba Proteus, *Amer. J. Psychol.*, 19, 1908, pp 232–241. The authors surmise that "this power of adaptation and of choice is perhaps the result of a learning process based upon the 'method of trial and error.' "

[3] J. Loeb, *Comparative Physiology of the Brain and Comparative Psychology*, p. 13, 1900. *V.* M. F. Washburn, *The Animal Mind*, 3d ed., Chap. II, on *The Evidence of Mind*, 1926.

[4] Support for the original incognitive aspect of consciousness here assumed comes unexpectedly from a paper written a decade ago by Bichowsky on the subject of 'pre-sensation.' His observers reported a preliminary phase of cognitive consciousness which was experimentally induced by looking at a color mixture "without visual boundary" and rotated "at a rate just sufficient to prevent flicker." He states: "The first effect that can be traced to a stimulus of the sense-organs is a feeling which does not possess spatial or temporal quality, that is to say, is not felt to be located or extended in space or time, or to have the definite qualities and relations usually associated with sensations. Such feelings or presentations . . . can not be described accurately, as they have none of the substantive or relational qualities necessary for description. They can only be felt. . . . These pre-sensations, however, have emotional tone and feeling quality. . . . " *V.* F. R. Bichowsky, The mechanism of consciousness: pre-sensation, *Amer. J. Psychol.*, 36, 1925, pp. 588–596.

[5] J. E. Coghill, The neuro-embryologic study of behavior: principles, perspective and aim, *Science*, 78, 1933, pp. 131–138. *V.* also his *Anatomy and the Problem of Behaviour*, 1929.

sized the gradual restriction of an inherent total integration in the direction of increasing specificity. He calls it "the principle of progressive organization from the whole to the part." His theory depends upon a time and a space factor.

In the temporal order he has chosen between the possibility, on the one hand, of a gradual integration on the basis of a growing complexity and organization of reflexes depending for their stimulation on outside sources and the more plausible probability, on the other hand, of a total integration and patterning from the beginning with increasing restriction in the direction of specific functions. On the basis of time, then, the total pattern or integration leads to the partial pattern or individuation through the process of gradual inhibition. Postural attitudes with their mental analogue of attention through acceleration become movements of progression with their mental attitude of anticipation. In the spatial order through the gradual creation of refined neural pathways, sensory structures, and motor mechanisms, increasing restriction also takes place. While the systematization of this principle involves hypothetical deduction, the fundamental facts are matters of direct observation in great detail. For example, the actual movements of amblystoma were observed for long periods of time. They showed a spontaneous growth from within, in the direction of more and more restricted movements confined to specific parts.

The entire theory is, of course, a supplementation of reflexology, which emphasizes the increasing ramification between simple reflexes. This theory of the growth of the reflexes has thus far underlain much of our work on animal behavior. When the instincts were allowed to exist at all, they were often conceived only as complicated forms of reflex response. In this general drift reflexology has followed many of the older principles involved in associationism through the history of English psychology. The Coghill theory, therefore, forms a counterblast to a widely current way of thinking A more judicial reaction would be to say that it proposes a view which supplements the current reflex hypothesis. By showing, on the one hand, that the lashing of the tail occurs in the first place as a general movement of the entire body, which then becomes restricted gradually to the tip of the body, and by proving, on the other hand, that a postural position of the head later becomes a general swimming movement, Coghill has demonstrated the gradual integration of movements within the organism. In a certain sense his view rounds out the rather one-sided hypothesis which was previously stressed, that such behavior mechanisms are gradually built up on the basis of outside stimulation.

This supplementation recalls one of the criticisms of the Darwinian theory of evolution, only in this case the supplementation was reversed. Darwin showed the enormous adaptation of the organism from within to combat

the environment without. As a criticism of this one-sided theory Henderson wrote a highly commendable book which served as an inquiry into the biological significance of the properties of matter. He admitted that it was not a novel hypothesis, because the doctrine was already familiar in the early part of the nineteenth century. While it is difficult to abbreviate the entire argument of the book a few passages will help to state Henderson's position: fitness becomes a mutual or reciprocal relationship between the organism and the environment, if part of the environment is shown to be extremely fit for the possible survival of living organisms within it.

"Yet natural selection does but mold the organism; the environment it changes only secondarily, without truly altering the primary quality of environmental fitness. This latter component of fitness, antecedent to adaptations, a natural result of the properties of matter and the characteristics of energy in the course of cosmic evolution, is as yet nowise accounted for. It exists, however, and must not be dismissed as gross contingency."[1]

The argument involves one of the difficulties attending any postulation of cause and effect, when as a matter of fact the relationship may often be reversed. Berman's book, for example, presents only one side of the issue in its title, "The Glands Regulating Personality." An equally good case could be made out by way of supplementation in a book entitled "The Personality Regulating Glands." In other words, we have confronting us here the various possibilities of the mind-body relationship. Students of psychology know what the problems of this relationship are and the many theories that have been advanced on this point. The same situation holds for any relationship between a living organism and its environment. In terms of some of the newer theories of neural integration like those of Franz,[2] Lashley,[3] and Cameron,[4] we are witnessing the effect of hypotheses corresponding to those of Coghill.

From the point of view of developmental psychology Werner has approached our problem in a somewhat similar fashion. On the basis of neurological growth and from the point of view of child psychology he has made it clear that the genetic growth is not a stepwise affair. Each neurological and mental improvement is qualitatively different. The process is called one of increasing differentiation and progressive centralization. This

[1] L. G. Henderson, *The Fitness of Environment*, pp. 274–275, 1913.

[2] S. I. Franz, Variation in distribution of the motor centers, *Psychol. Monog.*, 19, 1915, No. 1, pp. 80–162; The evolution of an idea; how the brain works, *Univ. of Calif. Bull.*, 1926, pp. 1–35.

[3] K. S. Lashley, Nervous Mechanisms in Learning, in *The Foundations of Experimental Psychology* (ed. by C. Murchison), pp. 524–563, 1929.

[4] N. Cameron, Cerebral destruction in its relation to maze learning, *Psychol. Monog.*, 39, 1928, No. 1, pp. 1–68.

is illustrated in the typical attitudes of the child with respect to the outward world of objects. They are perceived as an inner expression and compre hended physiognomically. At birth consciousness can be described only as a dull awareness in which sensory and affective components are fused together in an undifferentiated way. Here Werner follows Stern. The affective elements only gradually emerge and become individuated.[1]

In support of the phylogenetic theory we may also draw upon the excellent studies made by Gesell on children during the early weeks after birth and to the inferences drawn from foetal responses. He has listed some nine characteristic 'behavior' patterns in connection with the eye-hand reaction during the first forty weeks of life. In interpreting these results, he too emphasizes maturation as referring "to those phases and products of growth which are wholly or chiefly due to innate and endogenous factors." This interpretation was strengthened through the observation of 'behavior' patterns in twins. The correspondences "were literally uncountable." From 13 developmental examinations 612 separate comparative ratings were made. Of these, 513 showed identical or nearly identical correspondence while 99 attempts gave only minor disparities. Most important of all in support of our theory are the studies on developmental progression and emotional behavior. The following quotation is directly to the point:

"The rôle of maturation in the control of emotional behavior has had scant recognition. The primary emotions have been discussed as though they were elementary stable phenomena subject only to the changes of social conditioning. This is the implication in much that has been written concerning the emotion of fear. It seems to us that the problem has been oversimplified. Fear may be an original tendency, but it is subject to the genetic alterations of organic growth as well as to organization by environmental conditioning."[2]

But we are here much more concerned with Gesell's reaction to the old theory of conditioned reflexes as over against the newer organismal concept of maturation.

"The extreme versions of environmentalist and conditioning theories suffer because they explain too much. They suggest that the individual is fabricated out of the conditioning patterns. They do not give due recognition to the inner checks which set metes and bounds to the area of conditioning and which happily prevent abnormal and grotesque consequences which the theories themselves would make too easily possible."[3]

The theory of organismal maturation stresses one phase of the more specific theory related to the inherent development from whole to part.

[1] H. Werner, *Einführung in die Entwicklungs-psychologie*, pp. 1–61, 1926.

[2] A. Gesell, Maturation and infant behavior pattern, *Psychol. Rev.*, 36, 1929, pp. 307–319.

[3] *Ibid.*, p. 318.

Self-impelled internal maturation safeguards the individual from helter-skelter conditioning from without and serves as a balancing mechanism.

This view also conforms to the general hypothesis of Lashley in favor of what he calls "spontaneous compensation or adaptive reorganization." While we are not as yet able to explain fully the neurophysiological mechanisms of such normal organization of behavior, numerous experimental studies indicate to him an internally composed mechanism which maintains under most conditions its normal stability. He says:

"Such phenomena suggest that the nervous system is capable of a self-regulation which gives a coherent logical character to its functioning, no matter how its anatomical constituents may be disturbed. If we could slice off the cerebral cortex, turn it about, and replace it hind side before, getting a random connection of the severed fibers, what would be the consequences for behavior? From current theories we could predict only chaos. From the point of view which I am suggesting we might expect to find very little disturbance of behavior."[1]

The main principle which we may gather from these neurological and anatomical studies is that there is a continuing development of internal dynamic systems which become more and more integrated and equilibrated. Through the destruction of the cerebral centers under experimental conditions, the resultant behavior is not modified by way of reduction or subtraction, but by way of disequilibration and dysintegration. Turning now to the mental side we find a similar situation. Without necessarily committing ourselves to any theory of mind-body relationship we may then borrow the principle already found serviceable in the field of biology and psychology, which specifies an individuation process. Although quotations, tabulations, and experimental evidence are drawn from these cognate fields, we shall stay entirely on the mental side of the fence. The illustrations which we draw from physiology and neurology are simply parallel illustrations. Body is the nearest neighbor to mind. When we find individuation taking place physiologically or neurologically, we can safely assume that the same principles may be operative on the side of experience. If we suppose that the affective processes or the elementary feelings are the primordial responses of experience, they are not simply added to in the growth of the mental life but become interwoven in a balanced system. At the same time they retain many if not most of their

[1] K. S. Lashley, Basic neural mechanisms of behavior, *Psychol. Rev.*, 37, 1930, pp. 19–20.

elementary characteristics which we might enumerate under several headings:

1. They still are as vague and indefinite as was this original phase of consciousness. This accounts for their present indefiniteness, their lack of objectivity, their essential subjectivity, and their failure to be itemized out of a complex consciousness in the same manner as are sensations, perceptions, ideas, and the like. Without stretching the meaning of 'vague' too much we might also on this assumption explain the omission of the attentive attribute. In all strictness we can not say that this attribute has disappeared: for it never had really appeared. We are at the bottom of the ladder of consciousness, when it is just beginning to be differentiated from unconscious physiological responses.

2. The next important bearing is on the matter of its qualitative characteristic. Most psychologists agree that there are only two qualities by whatever name they pass. The author has already pointed out that even here we stand on somewhat shaky ground because never in the history of psychology, save in the original confusion of unpleasantness and pain, have the two essential qualities been known by any but positive and negative symbols. Such a designation, which names one quality positively and the other one merely by a negative prefix, is uncommon in the description of any phase of the mental life.[1] But again this is as it should be when the qualities are on such an elementary status and somewhat defy definition, delimitation, and even description. The situation, then, is that here is a very elementary form of consciousness which has only two qualities, one of which is merely the opposite of the other. We are dealing with forms that will not readily compare with later, more developed forms of conscious processes.

3. The whole difficulty of deciding whether or not the affective element or the elementary feelings exist in their own right is also more easily explained in terms of their extremely rudimentary nature. According to the theory of advancing integration from whole to part, an elementary process of this sort would, in the normal course of events, be more easily adapted to everything else that succeeded it rather than to standing out alone. Hence the vacillation of its status from attribute to element and back again to attribute. For reasons which have been indicated in a previous chapter, we can no longer doubt the convenience and necessity of its systematic isolation, but we must also here recognize that in terms of its primordial appearance it can not be easily compared with any of its legitimate successors in the line of mental development.

4. We may consider the easy confusion of affective responses with sensations of various sorts as a plausible circumstance at the first level of development. While in the earliest animal forms there were probably no sensations, only elementary feelings, as soon as any kind of sensation, like a chemical sense, appeared, the elementary feelings would become attached to it. The

[1] C. A. Ruckmick, The psychology of pleasantness, *Psychol. Rev.*, 32, 1925, pp. 362–383.

characteristic consciousness of the whole organism would spread out, according to the theory of progressive integration, from whole to part. At first there might be a confusion and the name of the sensation, like pain, would not be sharply delimited from the feelings of unpleasantness, but more specifically other sensations, when they came in, especially of the cutaneous, kinaesthetic, and organic groups, would be intimately tied up with the already present feelings. Like the sensation of pain, the motor and organic sensations were only more recently analyzed by systematic psychology and they continued to bear subjective reference to the organism as a whole. At the same time they have held a very prominent place in the more current theories of the affective life. We need only to recall the prominence of the visceral sensations in the James-Lange-Sergi theory, in the Dunlap hypothesis, and in many similar doctrines. Equally important is the relation of these motor sensations in the theories that involve avoidance and pursuit, even when this hypothesis is carried forward to the intellectual processes themselves.

To summarize these four fortifying points we may say that the phylogenetic theory is indirectly substantiated by the inherent nature of the elementary feelings. We have pointed out (1) their inherent vagueness and lack of clearness, which prevents them from becoming an independently existing item of consciousness; (2) their peculiar qualitative nature, which even at the present day can be described only in terms of pleasantness and its opposite; (3) their uncertain status in systematic psychology as to whether they deserve to be classed as an element or as an attribute of other elements; and (4) their ready transformation into sensory experience because of their early attachments to the next group of experiences to be developed in the simplest organisms.

3. A Formulation of the Phylogenetic Theory. - A concise statement of the proposed theory of the affective life is now called for. The proposition can be put in a double form.

1. *The affective life begins with consciousness itself in the lowest forms of animal life. The simple or elementary feelings, or the affective processes, are to be identified with this early form of experience. In other words, consciousness is nothing more than feeling in the technical sense of the word.*

2. *As the mental life develops, this elementary phase of consciousness spreads from whole to part in the sense that it becomes attached to, that it permeates through, every succeeding phase of developing conscious processes. On the neural side, therefore, no such receptor or effector mechanism is required, since none was needed in the first place when the animal was nothing more than a single cell. It uses, however, all existing channels for the conveyance of electrochemical energy, especially those structures like the sympathetic and parasympathetic branches of the autonomic*

system and the plexuses, which most speedily transmit energy from the whole organism to the part.

The plausibility of any theory like this rests, of course, not only on parallel data from the biological field but principally upon its applicability to mental phenomena which are more readily explained in this way. The theory of phylogenetic origin, implying a gradually unfolding pattern from whole to part, is perhaps best illustrated in two ways through its application to the growth of the mental life from sense-feeling to sentiment and also through the feasibility of explaining phenomena which occur in the degeneration of mind or in its extreme variations. Cyclic disturbances, introversion and extroversion, euphoria, and the like, demonstrate its importance through the principle of reversion. Clearly if a theory is to hold for the gradual development of the affective life as a continuously unfolding process, it should also show its power to organize and explain the facts attending the degeneration or disintegration of affective experience. In the main, however, since growth is normally more frequently evinced than degeneration, we should expect it to apply first of all to the evolution of emotional processes. When we analyze these processes, we must not forget the inherent principle of individuation which takes place. In this respect it parallels on the mental side Coghill's principles laid down in connection with the evolution of the motor and nervous system itself. They are briefly stated as follows:

" . . . first, the primacy of a motor mechanism of total integration; second, the development of mechanisms of partial integration through localized acceleration of growth; and third, progressive organization of the nervous system from the whole to the part."[1]

He elucidates this matter of individuation by distinguishing it from 'specialization' or 'specification' as follows:

"By way of definition, it should be noted that individuation used in this sense is not the equivalent of specialization or specification, for these processes constitute a functional adjustment of the organism to the environment. Individuation, on the other hand, brings about a definite and peculiar relation of a part of the organism to the organism itself as a whole. Individuation, like integration, is a purely intraorganismic process. It expresses itself, in part at least, through local acceleration of proliferation and differentiation of cells in a relatively equipotential growing system, according to the second neuro-embryologic principle I proposed a moment ago. Furthermore, it conforms to the third principle in the progressive organization from the whole to the part."[2]

[1] *Op. cit.*, *Science*, p. 132.

[2] *Ibid.*, p. 134.

On the lowest level of development, the affective life in its most rudimentary form wells up throughout the whole of experience, with which it is in fact identified. It is significant to recall in this connection that, throughout the systematic presentation of the affective life in Wundt, feeling is determined both by the sensory or ideational context and by the whole condition of consciousness.[1] Through successive stages of development it becomes individuated when newer forms of consciousness progressively appear, but most of its earlier characteristics are retained. Hence its present ambiguity in systematic psychology. That remnants of an earlier rather important sensory quality corresponding to the chemical sense likewise also appear in man is the contention of Crozier, who points out that some vapors still irritate the eyes, nose, and mouth in a way not directly associated with touch, smell, taste, or pain. In fishes and amphibians this chemical sense spreads out over the whole integument but in reptiles, birds, and mammals it is confined only to a few exposed mucous membranes. On the sensory side this may be another case of gradual individuation.[2] We shall now have to trace the process of this individuation through progressive stages of mental development.

4. Individuation of the Affective Life.—As has just been indicated the first steps of growth in the affective life are prepared for by the entrance of sensations of the coenaesthetic, systemic, or organic sensory group, which became thoroughly saturated with the pleasant-unpleasant responses. They are the ancestors of the general affective state which we now call euphoria or the feeling of well-being. Somewhat opposite, though not exactly so, are the allied states of nostalgia, ennui, depression, and general objectless melancholia. Titchener himself hints at this when he allocates the affections to the peripheral free nerve endings which he takes "to represent a lower level of development than the specialised receptive organ."[3] It is equally pertinent here to recall that pain, which was historically joined with 'pleasure' as an affective quality, has also generally been assigned to the free nerve endings.

Growing out of such general bodily feelings, increasing individuation continues in the direction of specific attachments of feelings with sensory groups like those of hunger, thirst, nausea, headache, and many of the primary colligations with odors of various sorts, which in early

[1] E. H. Hollands, *op. cit.*, p. 212.

[2] W. J. Crozier, Ionic antagonism in sensory stimulation, *Amer. J. Physiol.*, 39, 1915, pp. 297–302; G. H. Parker, *Smell, Taste, and Allied Senses in the Vertebrates*, pp. 102–109, 1922.

[3] *Lectures on the Elementary Psychology of Feeling and Attention*, p. 292, 1908.

animal life held supreme importance for the welfare of the organism. Other sensory groups were brought into the picture, especially the motor or kinaesthetic group, then later the cutaneous and much later the visual and auditory. Remnants of these combinations are still in use. Restlessness, strain, and relaxation are now more generally classified in the motor group of sensory experience.

In fact the other axes of the Wundtian tridimensional scheme and the second axis of the Roycian scheme are good examples. In the tactual realm we have the slimy, clammy, sticky, and other definitely unpleasant sensory experiences, as compared with the 'feeling' of jade and driftwood on the pleasant side. In the auditory field we have the biologically important shrieks and cries of pain or of distress and the squeaking, moaning categories which are allied to it. A modernized example is the squeaking of chalk on the blackboard or the filing of tin. This is particularly retained in the human female sex since apparently this sex is much more closely tuned to biological stimuli and genetically imbedded responses. Thus has developed by means of the process of individuation the next step in the affective life, namely, the sense-feelings. This was possible only when sensations, especially those with objective relations, arrived on the scene. We, therefore, have the odd combination at this level of an objectively referred sensation pointing to conditions outside the organism in the later stages of development married to a feeling which points in the opposite direction to the animal's own welfare and disposition. In fact, throughout the affective life this odd marriage persists and, therefore, in the emotional responses we have highly cognitive factors joined with predicaments that reflect the inherent bodily conditions. Dunlap makes this point of transition clear when he says that these feelings often have an ambiguous reference. Hunger, thirst, satiety, *etc.*, "are sometimes classed as sentienda and sometimes as affects." Even sensations like warmth, cold, pain, and pressure on occasion refer principally to the body and at other times to outside objects. In the former instance they are principally affective, in the latter case they are for the most part cognitive.[1]

After the development of the sense-feelings, with their references backward to the welfare of the total organism indicated by the feeling process as a whole, we find the gradual emergence of cognition at the higher level of perception. When this type of individuation takes place, *i.e.*, when situations, total events, relationships, and the like, are cognized for the first time, the ground is prepared for emotional responses. But even at this level a harking back occurs which seizes the entire organism both mentally and bodily. While emotions are directed outward both through their cognitive references and through some of their accompanying expressive movements, the subjective factor of the original elementary feeling which forms the groundwork

[1] *Elements of Scientific Psychology*, p. 313, 1922.

of the emotions remains. Even some of the expressive movements are of a protective and, therefore, of an egocentric type, indicating clearly their original heritage and inherent qualitative nature. We have seen, as Crile[1] points out, that for the most part animals which are well fortified with bodily mechanisms for aggression or flight in many such predicaments do not show fear under circumstances of attack but rather rage and anger. This further illustrates our theory that a development on both mental and bodily sides occurs to some extent from within. Bodily mechanisms, especially of the motor sort, are accompanied by a distinctive type of emotion, but the main point which we are now making is that when development takes place in the mental life the general subjective reference is retained.

Man inherits all these neural and mental tendencies in the affective life because, as Darwin and others have shown, even our facial expressions not only resemble those of lower animal forms, but retain many characteristics useful in a more primitive environment.[2] At the same time growth in the affective life takes place because now, according to our present knowledge, ideas make their first appearance on the stage and are also involved in the emotional process. An illustration of this type has been given in a previous chapter. Naturally, however, the entrance of ideas into the frame of the mental life provides the occasion for a further individuation of the general affective process. We are now prepared to develop that form known as the sentiments. While sentiments also may be attached to, or be the resultant of, perceptual processes, their general differentiation centers on the abstract relationships involved in them. For the first time, too, we notice that the subjective reference has become weaker. Slight indications of this have already occurred in some of the types of emotion but this is to be expected as the process becomes more and more individuated and, therefore, less and less related to its source. The characteristic suffusion and the general seizure are still present in the sentiment. The reference to bodily welfare, however, is almost wholly lost.

When we arrive at platforms of still greater individuation we have, at least in part, the principle of reversion operative. In the experience of mood or of general disposition and temperament, the response has become so long drawn out in time and attenuated that it again applies to the whole personality. Most frequently, especially in the latter two types of affective life, the application is a social one and, therefore, would naturally imply the whole individual as reflected in his behavior attitudes and as evaluated by others about him. But at any rate the suffusion has become very general and is personally oriented. In

[1] *Op. cit.*, pp. 56, 63, 70.

[2] C. Darwin, *The Expression of the Emotions in Man and Animals*, 1873.

short, in its higher ranges affection becomes finally attached to the entire self and often has a self-conscious reference. As we have said before the test of any such phylogenetic theory, after it has been applied on the upward slope of development, must also hold on the downgrade toward degeneration, or at any rate for those variants which mark off the right and left boundaries of their generalization. When we are moody, especially over a period of several hours, we manifest, as Bridges[1] has pointed out, the incipient stages of the cyclic disturbances. This type of affective life is, then, a reversion to the general plane of mere feeling without an objective reference but with a subjective one. In general there are no motor mechanisms involved, or else movement, behavior, posture, and facial expression are only vaguely implied. Essentially the complex organism on its mental level returns to the amoebic form.

Perhaps the picture is more clearly delineated in the introversions and extraversions and their allied categories. In these two there is a reversion to type where the individuation from whole to part goes back to the whole, especially in those cases where the subnormality was developed sometime during the life of the individual. Another way of looking at it, as in all other genetic theories, is that individuation has never progressed to the normal limit and that here we have a retarded development in the individuation process. This would more probably be true of congenital cases of abnormality. But certainly the picture presented is one of opposites or contrasts. The introvert again is overmindful of himself on the affective level while the extravert lives too much in terms of the environment, without a balance between the two mutually inhibiting processes such as we find in the ambivert. Other significant interpretations of the affective responses in subnormal individuals will be more extensively treated in a later chapter on the pathological aspects of the affective life.

5. Diverse Nature of the Emotional Life.—We have still to deal more specifically with the problem of the great variety of emotional experiences and with its neurological and general physiological background. We must not lean too heavily, however, on our phylogenetic theory. In other words our theory simply advocates a point of view on the mental side that will explain, first, the gradual unfolding of the affective life from within and, secondly, a gradual restricting process from the full sweeps of simple feeling over the entire mechanisms to its more limited and specialized functioning in more particular units. At the same time, as we have seen, many of the characteristics of the older processes are preserved in our present consciousness as reminders of previous functioning.

[1] J. W. Bridges, *Psychology, Normal and Abnormal*, pp. 188–209, 1930.

But outside influences must not be overlooked. We are not overthrowing all interpretations of the conditioning or learning sort. We could not get rid of the environment even if we wanted to. All we aim to say is that many writers have again fallen into the error of conceiving the organism in terms of receptive mechanisms which are entirely at the mercy of stimulation. It has, in our opinion, forces from within which not only refuse to function at every beck and call from the environment and in any direction whatsoever, but also manifest plans of their own which are to be put into effect from internal drives that have a long-seated phylogenetic history. The result, of course, is a compromise.

It is clear that much modern thinking, even in the physical sciences, follows this direction. Instead of regarding the organism as a separate unit and the environment as another entity wholly independent of it, we find again that these are conventional abstractions and that an interplay of the forces exists in the actual realities of life. Not only do the influences from the environment reach out and affect the organism but the organism reaches out and affects the environment. In a certain sense it creates that environment and does so continuously throughout life. If we keep this in mind we shall get a clearer picture of the development of the affective life.

Besides the unfolding process on the plane of a progressive integration or maturation and increasing specificity of function we find that, especially through the cognitive elements, from sensation on to the higher intellectual processes, the environment plays an enormous rôle in differentiating the emotions. Ever since an objective reference took the place of the general subjective sweep of elementary feelings, emotional responses have become distinguished in terms of inherent responses organized to meet such external situations. Through the enormous ramifications of neural energy inciting to muscular movements, internal secretions, and changes in the reflex vital processes and in the total metabolic rate, a great variety of patterned responses resulted. The conscious concomitants of these greatly diversified processes, together with a wholesale intervention of differentiated meanings, furnished the background for the long catalogue of names of the emotions.

6. Physiological Background.—In the main we can follow the general drift of Allport's hypothesis both on its psychological and on its neuromuscular sides.[1] In brief, he recognizes the all-pervasive affective element and a differentiating factor to distinguish emotions which fall together in either the pleasant or the unpleasant group.

[1] *Op. cit., Psychol. Rev.*, pp. 132–139.

anatomy is conventionally most exposed to view. But the lower animals, under the conditions of their primitive lives, also show a deep interest and concern in the faces of other animals. Domesticated animals look at the faces of their masters and mistresses in an attitude of fixed regard, and the successful animal trainer knows that the power of his own facial expression is paramount to the force of the whip as punishment or to the inducement of a sweet morsel as a reward. Even today in the most complicated of modern civilizations we search for meaningful expressions in the faces of our fellow men or women. Many portrait painters see individuality and aesthetic interest in the delineation of the hand. But when we wish to preserve in

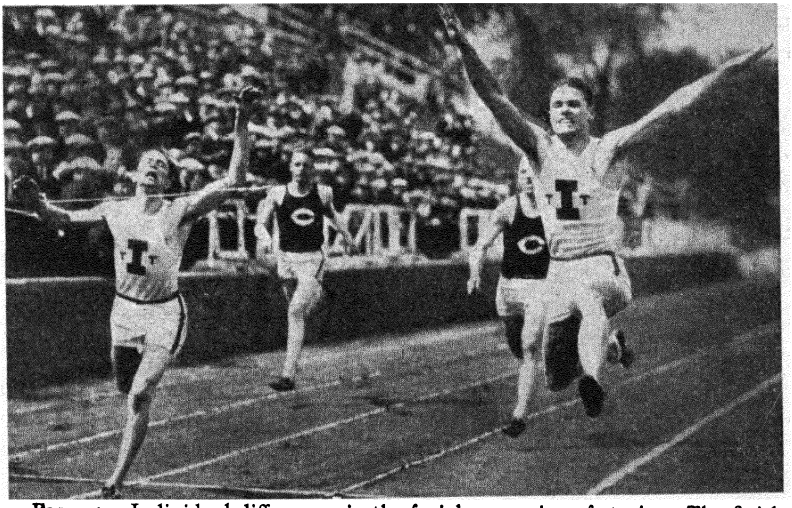


FIG. 15.—Individual differences in the facial expression of strain. The finish of the 100-yd. dash in the Chicago-Iowa dual meet held in Iowa City, May, 1923. Winner, Eric Wilson, Iowa. Second, Charles Brookins, Iowa. Time: :09.9. (*Courtesy of Mr. F. W. Kent, University Photographer.*)

our memory the best likeness of the character of our friends and relatives we generally decorate our walls with portraits of their most appropriate facial appearance. It is a truism if not a platitude to remark therefore in this connection that the whole epitome of personality is concentrated in that portion of our physical anatomy which towers, as it were, above every other form of outward revelation from the depths that are concealed within. In short, as generally conceived, the face has become an index to moral, spiritual, and intellectual values in the individual, and a key to the transfer of meaningful expression from one person to another.

Of course we have had our disappointments in this connection. More than once we have been deceived by what appeared to be a wholesome or an intelligent face. An attractive facial demeanor has wheedled many a man and woman out of large sums of money or into a course of action which proved to be their undoing. In one of the best known tests the face voted as the most intelligent among a large collection of faces proved to be that of a feeble-

minded boy. On the other hand many a face, like the celebrated face of Socrates, has been a rough, and even a repugnant and repulsive exterior to a beautiful character. These are exceptions which show that we must proceed with caution. Like so many other generalizations there are numerous devia-

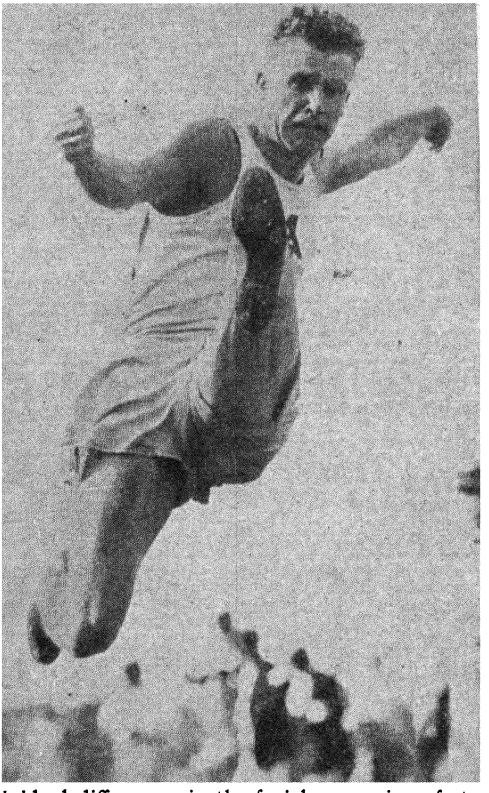


FIG. 16.—Individual differences in the facial expression of strain. William E. Schmitz, University of Michigan, who placed third in the broad jump in the Western conference championship meet at Iowa City in 1922 with a leap of 22 feet 5¼ inches. (*Courtesy of Mr. F. W. Kent, University Photographer.*)

tions from the law, since in every case we must make a particular judgment in an individual case. The standard of reference can be only a crude guide to our decision. Wordsworth, in the *Triad*, puts this thought well in these words:

> "Alas! how little can a moment show
> Of an eye where feeling plays
> In ten thousand dewy rays:
> A face o er which a thousand shadows go!"

Paterson has made a serviceable summary of more recent physiognomical and phrenological claims and their statistical investigations. All these

studies, many of which definitely referred to facial types and contours, resulted in coefficients of correlation at or near zero, indicating that analyses, made on the basis of discovering true indices of a mental or even of a psychophysical sort in facial appearances, are generally unreliable. This concluding remark, at the end of one of the studies reviewed, is to the point:

"Here is devastating statistical refutation of the fantastic claims put forward by the high priests of physiognomy and phrenology."[1]

Since in our point of view from a genetic angle, the elementary feelings lie at the very base of our conscious lives, and because of the doctrine of individuation, from whole to part, they therefore infiltrate into the whole fabric of our mental being, it is hard to differentiate emotional expressions of the face from other possible expressions. Nor is it strange that so much has been written from all sides about facial expression when we realize how accessible the face is to direct observation. Kant, for example, quotes a famous Irish actor and manager, James Quin, as saying of a fellow actor in his company, Charles Macklin, "If God writes a legible hand, that fellow is a villain!" Once he addressed Macklin personally, without any provocation, with the words, "Mr. Macklin, by the *lines*—I beg your pardon, Sir—by the *cordage* of your face, you should be hanged."[2]

No elaborate devices or techniques are required to make a beginning here. The size and shape of the head and face, its prominent features, furrows in the forehead and about the eyes, the twitching of muscles of the cheek, the setting of jaws, the thickness or thinness of the lips, the curling of the corners of the mouth, the shifting or direct fixation of the eyes—many of these often noticed principally in conjunction with what is said—all these have from time immemorial furnished right or wrong cues to real meanings and real appraisals of personality. Our own popular poet, Longfellow, has recorded in eloquent language in the *Hanging of the Crane* that speech is not a necessary accessory to facial expression:

"He speaketh not; and yet there lies
A conversation in his eyes."

In common practice this 'reading of faces' is still vigorously going on. Often success in commercial and professional fields depends on this item in our physical make-up. Long after death this potent influence continues.

There are, then, four factors which have gone a long way to establish the importance of the study of the face. (1) From a social point of

[1] *Op. cit.*, p. 220.

[2] P. Fitzgerald, *A New History of the English Stage from the Restoration to the Liberty of the Theatres in Connection with the Patent Houses from Original Papers in the Lord Chamberlain's Office, the State Paper Office, and Other Sources*, Vol. II, p. 115, 1882.

view attention was directed to that portion of our naked anatomy which conveyed, together with the voice, an enormous amount of meaning. Hands might be busy doing other things. That very expressive portion of the spinal column, the tail, which helps out in many animal forms to convey feeling, became hypertrophied and invisible. The head had recently become erect and prominent and individuals met not only 'head on' but 'face to face.' Specifically *cognitive as well as affective meanings are interpreted in the face of an individual.* (2) The face became significant as a symbol of the individual. Although it is often said that all Chinamen look alike or that all babies look alike, to those familiar with the Chinese, they certainly do not look alike, nor will a mother admit that her infant is indistinguishable from the others in a nursery. From infancy on the characteristic marks begin to appear so that even identical twins can be told apart from very early days of life. Portrait studies of the face at rest then take their place as a key to a particular person. *The face becomes a means of identification of the individual.* (3) From that point on it was an easy transition to the study of the face as a symbol of character. Galton was reputed to have been the first man to suggest composite photography as a means "of procuring really representative faces."[1] Physiognomy as such had really a much longer history, but Galton proposed photography of the face in this way as opening "a fertile field of research to ethnologists." In similar fashion the face became not only an index to different kinds of personality, but a means of studying familial characteristics, professional occupations, and symptoms of disease. In short, *the face became an index of generic traits of personality.* (4) Again we pass on to the next degree of abstraction and notice the importance of the face in art. Painting and sculpture not only became interested in reproducing likenesses of specific individuals during life or of conceptual forms of glorified heroes, but sought to suggest qualities of human, and sometimes animal, experience. Suffering, religious devotion, virtue, military prowess, and the like were to be depicted as abstract human values conveyed to the visual sense through concrete materials. Again we have cognitive and affective meanings conveyed, now not from individual to individual, but as the artist's symbolization in terms of his own interpretation. Thus *the face is utilized to convey abstract symbolic values in human experience.*

2. Historical Development of the Study of the Face: Physiognomy and Phrenology.—From the foregoing account it is evident that so keen

[1] F. Galton, *Inquiries into Human Faculty and Its Development*, p. 8, 1883; *V.* also pp. 340, 349, 354.

an interest in the human face, form, and modes of expression would not long develop without being organized into a definite pseudoscience. Discussions of the general subject are to be found in the various ancient literatures. Like cosmology and cosmogony, astrology and astronomy, and alchemy and chemistry, physiology and physiognomy were twins of the same parents. Nor could they be always easily distinguished. The original purpose of the last-named pair of twins was quite analogous to that of many organized studies: it was born of curiosity but made to serve in a practical way when it became of age. Bacon gave it a general definition when he called physiognomy the "discovery of the disposition of the mind by the lineaments of the body." Most attention was naturally focused on the face. Even on its practical aspect the study was subdivided into (1) a method of discriminating traits of character and (2) a mode of divination of future experiences from features and bodily form. Like palmistry, which claims a Chinese origin 3,000 years before Christ, and like phrenology, which developed from it, physiognomy soon came under a scientific ban. Also through abuses which crept into this ancient profession its practice was forbidden by English law in 1743.

As in other subjects, Aristotle furnishes us with a convenient starting place in that he devoted six chapters of a systematic treatise to the study of physiognomy but some authorities regard this treatise as spurious.[1] There he supposedly discussed the general indications of character, such as genius and stupidity, timidity and impudence, mental strength and weakness, anger and fear, and other traits with their opposites. He dealt with the difference in the two sexes as regards hair, bodily form, shape of limbs, gait, and voice. As a naturalist he made many comparisons between the human being and the lower animals. Man was like the lion; woman resembled the leopard. Of most interest to us here as typical of his general procedure is, perhaps, his characterization and comparison of the individual in terms of the following kinds of noses:

PHYSICAL SHAPE	MENTAL CHARACTER	ANIMAL RESEMBLANCE
thick, bulbous	insensitive, lethargic	swinish
sharp-tipped, pointed	irascible, aggressive	dog-like
rounded, large, obtuse	magnanimous, generous	lion-like
slender, hooked, beaked	noble but grasping	eagle-like
round-tipped, retroussé	luxurious, pleasure seeking	like barnyard fowl
slightly notched at root	impudent, teasing	crow-like
snubbed, blunt	easy-going, self-sufficient	deer-like
open nostrils	sensuous, passionate	

[1] Wundt classified it as such, but he indicated that the relationship between man and the lower animals was already assumed in Plato's *Timaeus*, §44.

Other characteristics imputed to Aristotle include:

PHYSICAL TYPE	MENTAL CHARACTER	ANIMAL RESEMBLANCE
fine hair	timidity	deer, rabbit, sheep
rough hair	courage	lion, boar
thick fleshy neck	anger	bull
long narrow neck	timidity	deer
short neck	cunning	wolf

While his physiological and anatomical knowledge was great for his time and his attitude in general was remarkably scientific, Aristotle was, nevertheless, much given to conjecture and speculation. We must also be on our guard lest the interpretations of some of his fragmentary and perhaps unauthentic writings be overdrawn. In the main the earlier classical attempts at physiognomy were mostly descriptive, while during the Middle Ages practical application drove physiognomy into the channel of prophecy. The first printed work devoted to the subject of physiognomy was written by the great court astrologer to Frederick II, Michael Scot, probably about 1272, but printed as late as 1477. It was entitled, *De hominis phisiognomia.*

Both painters and scientists, however, soon took a more serious interest in the facial characteristics and expressions. Camper, for example, devised a practical method of demonstrating a variety of emotional expression in the face by changing the angles of the profile. Thus he appears to be one of the first artists who portrayed emotion on the basis of anatomical facts. His interest, however, was chiefly ethnological, since he was mainly concerned with a serious comparative study of racial differences in the facial expression of emotion rather than with emotion itself.[1] Although Leonardo da Vinci was not misled by the deceptive claims of contemporary physiognomy, he did admit that the delineations of the face indicated in part the nature of the individual. He even prescribed certain ways of drawing the face to portray emotional characteristics.[2] In his introductory chapter to the great classic on the subject, Darwin dismisses with a wave of the hand the many studies "on the recognition of character through the study of the permanent form of the features."[3]

[1] P. Camper, *Discours sur le moyen de représenter les diverses passions: dissertation physique sur les différences des traits du visage*, 1791.

[2] *V.* H. Krukenberg, *Der Gesichtsausdruck des Menschen*, 4th rev. ed., pp. 21–24, 1923.

[3] Darwin cites J. Parsons's list of "41 old authors who have written on Expression," in the appendix to the *Philos. Trans.* for 1746, p. 41. Also credit for "some good remarks" is given to the painter, Le Brun, who in 1667 published *Conférences sur l'expression des différents caractères des passions.* But in Darwin's judgment even the Dutch anatomist, Camper, who gave a number of lectures *sur le moyen de représenter les diverses passions* from 1774–1782, did not make "any marked advance in the subject."

But soon a real scientific attitude became manifest. In the eighteenth century J. K. Lavater, a great friend of Goethe's, had commented in a somewhat fantastic and mystic manner on the various types of faces and modes of expression as illustrated in portraiture and as related to traits of character. These discussions were edited together with some added essays of his own by Moreau in 1807. It is significant, however, that now discussions were taking an anatomical turn. Certain expressive movements, like those of frowning and fright, were being analyzed at least superficially in terms of specific groups of facial muscles. This was particularly noticeable in Sir Charles Bell's *Anatomy and Philosophy of Expression as Connected with the Fine Arts*, which first appeared in 1806. Darwin praises this work in high terms as furnishing not only the foundations but much of the superstructure of this branch of science. Bell not only stressed the opposite facial movements that are to be found in exhilarating and depressing emotions, but anticipated Darwin's third principle by pointing out that many of these outward expressions arose from the inward actions of the heart and lungs. Other contributions from the physiological angle were made by Dr. Cross of Glasgow, who in 1817 defended the physiological approach on the basis of general physiological principles, and by Dr. Burgess, who in 1839 published his *Physiology or Mechanism of Blushing*. In 1862 Dr. G. B. A. Duchenne introduced a new technique in his *Mécanisme de la physionomie humaine* through analysis by means of electrical stimulation of specific facial muscles, as a result of which he assigned a separate function to each muscle in the mechanism of emotional expression. He probably carried the notion of the action of single muscles too far, even for his day, but Darwin gives him credit for demonstrating which muscles are least subject to voluntary control.

At this time two major attempts were made to put the facts of physiognomy on a more scientific basis. T. Piderit published an essay on expression in 1859, but his better known work, *Wissenschaftliches System der Mimik und Physiognomik*, published in 1867, passed into three editions, the last reprinted as late as 1919. It was preceded by a shorter work in 1858, *Grundzuge der Mimik und Physiognomik*. He made the suggestion that the 'geometry of expression,' as a useful device for painters and sculptors, might be facilitated through the use of plaster of Paris heads which would demonstrate a variety of expressions. He made two important premises: that facial expressions were significant (1) because the muscular movements were closely associated with the brain, and (2) because they were used to support the organs of sense—especially, as Wundt later pointed out, the senses of taste, smell, and sight. The latter premise was probably well taken, since it

fitted into the theory of evolution which was soon to transform the doctrines of physiognomy. At any rate it was more in keeping with these tendencies than was the assumption of Gratiolet, who strenuously denied the expressive function of any specific muscle and explained the entire mechanism on the basis of sympathetically executed movements.[1] The coordinated movements of eye, ear, hand, and other features of the body accounted for practically all the expressions involved in emotion. As we have noted before, the former position begs the question of 'expression,' since this is obviously not an intended function of social intercourse, whereas the latter states what is obviously a fact, that coordinations are the order of the day. No one muscle acts alone, nor is it 'intended' to express anything. Of course, as Darwin points out, in the first place, a vast amount of habituation and modification takes place during life, based upon individual experience, and, secondly, a certain amount of inherited patterning is to be presumed before individual experience begins. One of the last books to appear on the subject was P. Mantegazza's *La physionomie et l'expression des sentiments*, in 1885. James quotes a passage from it which characterizes many of the works of that sort. A detailed account of hatred gives a "synopsis of its possible effects" in terms of facial and vocal expression, gestures, general muscular movements, and vasomotor responses.

From this point on physiognomy as such passed rapidly out of the picture and the evolutionary doctrines of Darwin, Spencer, Bain, and the rest took its place, or, rather, increasingly overshadowed it.

In the meantime another movement had gained considerable headway. We refer to phrenology. Someone has facetiously remarked that phrenology represents a situation in which psychology 'has gone to the head.' Not only the facial characteristics were now analyzed, catalogued, and interpreted, but the contours of the head as well. While there was little of significance in phrenology as a study of the face from the point of view of emotional expression, an indirect influence might be made out because it did take habitual affective dispositions into account. At the same time, the movement contributed to a further study of cerebral function and anatomy in that it made assumptions which soon clearly demonstrated a lack of real knowledge of the subject. It was the logical outcome of a faculty psychology combined with a search for the anatomical basis for individual differences in the mental life. A locus naturally had to be found for the numerous 'propensities' or intellectual 'faculties.' There were originally some thirty-four of them; now they numbered forty-two. The classical four temperaments, lymphatic, sanguine, bilious, and nervous, were taken

[1] P. Gratiolet, *De la physionomie et des mouvements d'expression*, 1865.

over. The second one had to do principally with the emotional life, giving "strong feelings and passions," while the first accounted for "mental languor, dullness, and inactivity." The brain became "the corporeal instrument of thought and feeling" and consisted of as many as forty-two separate organs that were conical in shape with their apices at the medulla oblongata. The "affective faculties or feelings, which

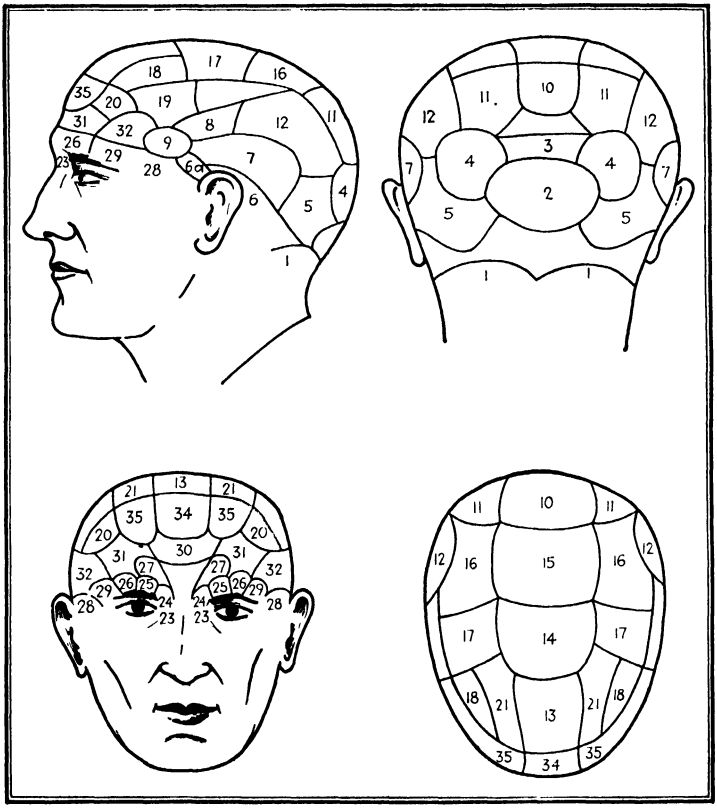


FIG. 17.—A sample phrenological chart. The numbers correspond to the faculties listed in the 14th edition of the Encyclopedia Britannica, Vol. 17, pp. 849–851. Some examples are given below.

originate the propensities, desires, and sentiments . . . [are] located in the portion of the head commonly covered by hair." Examples of these were: amativeness (1),* philoprogenitiveness (2), adhesiveness (4), benevolence (13), veneration (14), hope (17), marvelousness (18), mirthfulness (23), *etc.* Proofs were found in the citations of illustrious individuals whose heads furnished the prominences, or lack of promi-

* These numbers refer to allocations on the accompanying chart (Fig. 17), *q.v.*

nences, desired. The size of the base of the cones as displayed through the skull formed the criterion of measurement in each instance. Usually only the area around and above the eyes was included with the area of the rest of the skull in the diagnosis. These frontal areas were reserved generally for the faculties of perception and other intellectual activities. If the occipital portions of the head were relatively larger than the frontal, "there will be more of feeling than reason."

These and similar doctrines originated with Franz Joseph Gall, a serious and scientifically minded Viennese physician, about 1796. His lectures on the subject were abruptly brought to a close in 1802 at the order of the Austrian government, which judged them to be dangerous to morality and religion. Two years later he found an apt pupil in Johann Kaspar Spurzheim, with whom he traveled through Germany, Switzerland, and France. The French Institute at Paris appointed a commission to investigate their doctrines and claims. The report favored their methods of dissection but stated that their deductions were mainly hypothetical. The fundamental treatise on the subject appeared in 1809 under their joint authorship and with the translated title, *The Anatomy and Physiology of the Nervous System in General, and of the Brain in Particular, with Observations upon the Possibility of Ascertaining Several Intellectual and Moral Dispositions of Man and Animals by the Configuration of Their Heads.* Gall died in 1828 and Spurzheim died shortly after arrival in Boston on a lecture tour in 1832. G. Combe, a Scottish phrenologist, published his *Essays on Phrenology* in 1819, which in later editions became *A System of Phrenology* and had a pronounced influence abroad. He visited America in 1838 and also lectured in the German language in Germany.

Incidentally, Bentley gives Gall considerable credit for attempting to establish scientifically the principle of psychophysical dependence in relation to traits of character. That he subsumed twenty-five or more organs of the brain which were heritable, though modifiable through experience, was more the result of shrewd empirical observation and cautious generalization than it was a matter of mere guesswork. He insisted, against the tendencies of his day, that neural pathways must be traced from lower to higher centers. Starting from the English and French schools of sensationalism which sought to establish mind on a foundation of sensation, Gall argued that the organization of mind rested on as stable a structure of physiological organs as did the sensations themselves. Organization, in other words, was not to be explained merely by compounding, or by the laws and principles of association. The anatomical structures for the higher mental processes were therefore the object of his search.[1]

[1] M. Bentley, The psychological antecedents of phrenology, *Psychol. Monog.*, 21, 1916, No. 4, pp. 102–[illegible]

A number of schools of phrenology with their attending practitioners still survive. O. S. and L. N. Fowler published a book on *Phrenology, Proved, Illustrated, and Applied* in this country in 1836 and their influence was for a long time manifest. The Cornell psychological laboratory was originally endowed by a firm believer in these doctrines and the laboratory at the University of Illinois owns one of the best historical collections of casts, portraits, models, calipers, and other paraphernalia in the country. The theoretical points of view, which were typical of their time in that relatively little was then known of cerebral functions, can be stated as follows:

1. The brain was the sole seat and organ of the mind.
2. Mental powers or functions could be empirically analyzed into a definite number of separate faculties which could be combined into groups but which were nevertheless mutually independent in operation.
3. These faculties were mainly inherited and were localizable on the surface of the brain.
4. The size and prominence of each corresponding area are a measure of the intensity and frequency of its function with respect to the mental life as a whole.
5. A definite correlation exists between the outward prominence of a portion of the skull and the corresponding area of the brain beneath it.

That both physiology and psychology have moved forward from such points of view the serious student need not be told. It is commonly remarked that the locus for 'veneration' is now known to be closely related to the motor area connected with the movement of the big toe.

The question might well be raised: what significance has phrenology in the matter of facial expression? The answer lies in the fact that phrenology threw into bold relief the possibility of pushing the analysis of facial expression to a higher level of physiological and anatomical interpretation. It involved the doctrine of localization of mental functions. We are still occupied with the question of localization of neurological mechanisms. But today we not only know much more—though often in a negative way—about cerebral mechanisms, but we also have left behind us the concept of mental faculties. The affective processes in their various forms were also formerly involved in this phrenological interpretation. While positively we may still lack definite knowledge concerning the nature of emotion, of sentiment, and of disposition, we have learned negatively, nevertheless, not to look for their neurological correlates in any one portion of the cerebral anatomy, let alone the possibility of searching on the periphery of the

skull for evidences of the intensity and frequency of their functional activity.

3. Historical Principles of Facial Expression.—For the sake of comprehensive treatment we must again enumerate the Darwinian principles of facial expression. They form a pattern with the fundamental factors operative in the doctrines of James and Wundt. We have already discussed them under the following heads: (1) serviceable associated habits, (2) antithetic attitudes, and (3) neuromuscular responses. They are principles which apply to expression in general, but many of the illustrations are in terms of facial expression.

Wundt also advanced three principles which in part overlap and in part amplify the Darwinian principles. They also apply to expressions in general but are frequently exemplified in terms of facial responses. His first principle is that of *direct change in innervation.* After pointing out that gradually, as man becomes cultured, he tries more and more to bring all his movements under voluntary control—either by inhibiting those which he does not desire to exhibit to others or by imitating those intentionally that will serve him best under the given circumstances—Wundt showed that there are strong conative-affective experiences which result in modified movements. James was quick to notice that Wundt's first principle was mostly a rewording of Darwin's third principle. Wundt also here used the distinction between Kant's *sthenic* and *asthenic* groups of emotion. The first type result generally in increased excitability; the latter type in inhibitory or weakened reactions. As the various emotions with their hereditary patterns progress, the two processes may mutually counteract one another. The inhibitory effects may also be rapid in their effects, as in fright and in overpowering joy, or they may be gradually arising and more lasting in influence, as in grief, sorrow, and dejection. Voluntary control again may much modify these accompanying expressions. Blushing and paling and the flow of tears are among the symptoms under this principle, although the latter is mainly characteristic of human beings. It is a protective mechanism for the eye, as is shown through its function in removing foreign and dangerous objects. When visual ideas are present, as in man, it may also occur with embarrassing and obnoxious visual imagery.

The second principle was that of *association of analogous feelings.* This is a real contribution of Wundt's and is not specifically found elsewhere. It assumes that certain reflex movements that have as their adequate stimulus definite qualities of taste or smell, for example, become associated with corresponding ideational equivalents. The sensory end-organs for sweet tastes are massed near the front of the

tongue, therefore adequate stimulation would involve simply a slight withdrawal of the lips with the tongue ready to protrude; bitter tastes are sensed chiefly at the back of the tongue, hence a mouth opened in such a manner as to expose the rear portion of the tongue would result; and end-organs for sour tastes are massed at the side of the tongue, thus a side opening of the mouth would be most suitable to receive this taste. When the resultant sense-feelings then become attached to emotional complexes, the associated mimetic movements would also become the 'expression' of these emotions. The transfer of these responses to emotional experiences which symbolize 'sweet' dispositions and pleasurable attitudes, 'sour,' wry, and disgusting situations, and 'bitter,' poignant, and acrid reactions, would be a natural development in course of time. Similar mimetic reflexes would occur in connection with the movements of the nostrils. Obnoxious circumstances as well as offensive odors, agreeable situations as well as pleasing fragrances would be welcomed with similar receptions. It is still a curious fact that so much of the emotional facial expressions centers around the gross sensory mechanisms which have been the guardians of organic welfare: the mouth and nose.

The third principle is reminiscent of Darwin's first principle. It is that of the *relation of movement to sensory ideas*. Under this rubric are discussed all facial expressions and gestures which are not subsumed under either of the other two principles. Especially are the gestures of the arm and hand explained by this third principle. Many of the emotions are thus accompanied by movements, like the clenching of the fist, the pointing of the fingers and other positions of the palm and hand, the baring of the teeth, the opening or shutting of the eye, which express ideas referring to objects, events, and circumstances not immediately present to the senses. Darwin remarked that he found clenching of the fists as indicative of anger only in those tribes that used the hands in fighting, but Wundt stated that he found evidences of this gesture in very young boys, but never among girls. In closing, Wundt showed how many, if not most, emotional expressions called for more than one of these explanatory principles.[1]

While James did not specifically enumerate fundamental principles of expression, some five factors can be found, some of them in italics. Darwin's first principle is reworded thus: (1) *the revival in weakened form of reactions useful in more violent dealings with the object inspiring the emotion.* Eyebrows are raised to give the eye a better chance to see; distention of the nostrils became necessary for adequate breathing when a large part of the antagonist's body filled up the mouth cavity; and the laughing mechanism counteracts

[1] *Grundzüge*, Vol. III, pp. 260–271.

a tendency for the brain to become anaemic during joyous emotions. The next principle is equivalent to Wundt's second principle: (2) *reacting similarly to analogous-feeling stimuli.* This needs no further discussion since his illustrations are drawn largely from Wundt, Piderit, and Mantegazza. After these the treatment becomes less categorical. He mentioned next: (3) the "purely idiopathic effects of the stimulus" which were "mechanical or physiological outpourings through the easiest drainage channels." These include dryness of the mouth, diarrhoea, nausea, jaundice, sweating, flushing, micturition, and the like.

Here we are reminded of Darwin's third and Wundt's first principle. Briefly discussed also is another factor which is a sort of corollary of the first: (4) inherited habit or "organic memory of more violent excitement." The action of the unstriped muscles of the smaller arteries might serve as an example. Finally he mentioned (5) the principle of accidental origin. The nervous system is so complex in its development that there are many reactions which must have been evolved in conjunction with others of more useful service but which themselves were never directly useful.[1]

Since these principles were developed, little has been done to push the evolutionary inquiry farther. A possible exception may be found in some suggestions originally made by Frappa[2] and worked out in detail on psychiatric patients by Dumas.[3] According to this hypothesis there are only three fundamental emotional conditions corresponding to the three possibilities in muscular tension and neural innervation: (1) *joy* involving increased liveliness of muscular activity, greater tonicity, intensified facilitation; (2) *surprise* or astonishment, which spells arrest of action with momentarily great muscular tension but no response, a blocking or stoppage in the flow of energy; and (3) *grief*, which involves relaxation, decrease in tonicity, and general low ebb of metabolic process. One might visualize the first as a 'forward-moving' condition, the second as an upright 'stiff' condition, and the third as a 'falling-backward' condition. The Kant-Wundtian distinction of *sthenic* and *asthenic* emotions will be recalled here in connection with the first and last types, also the Külpe formulae expressed in the statement:

"(1) Pleasurable states are regularly accompanied by increase of the force of voluntary muscular action, and unpleasurable states as regularly by its diminution. . . .

"(2) Pleasurable feelings are regularly evidenced by increased power, though not by any constant acceleration of pulse. The first effect of unpleas-

[1] *Principles*, Vol. II, pp. 477–485.

[2] J. Frappa, *Les expressions de la physionomie humaine*, 1902.

[3] G. Dumas, *Traité de psychologie*, Vol. I., 1923.

ant feelings is generally a weakening of the pulse, without any necessary reduction of its rapidity; and this is followed, not by a simple return to the normal, but by an increase beyond it. . . .

"(3) The respiratory curves show a similar divergence. . . . "[1]

In a profusely illustrated volume Krukenberg makes the point that facial expressions are more reliable than other forms of emotional response.[2] He postulates two fundamental purposes in the mimetic expressions of the lower animals (1) to keep at a distance those enemies that would tend to destroy them and (2) to invite those of the opposite sex that would tend to perpetuate the species. Perhaps the second underlying aim is still implied in what we today call colloquially 'the come hither' look! The author goes minutely into the various characteristics of the human face and body as revealed especially in artistic productions.

We notice from the foregoing descriptions that almost all writers stress (1) the biological inheritance of many facial expressions, (2) the previous serviceability or significance of these responses under primitive conditions, (3) the effect of irradiation of energy over a vast network of outlets, which include most neuromuscular mechanisms, glandular activities, and other physiological changes, and (4) the modifiability of these expressions through voluntary and social control. Recently there has been a promising attempt to restrict these various expressions to three basic types, especially as studied in pathological subjects, but more work needs to be done before this can be established as a scientific hypothesis.

4. Demonstrational Models of Facial Expression.—Before we discuss in detail the experimental studies of facial expression we should become familiar with several models of the face in profile and in full form which are now available for demonstrational purposes, and which also lend themselves for use in experimental investigations. The first model is that by Boring and Titchener, which utilizes the profile with two changes for the nose, nine for the mouth and chin, four for the forehead, and five for the eye.[3] It is based upon the Piderit 'geometry of expression' with slight modifications made to secure better registra-

[1] *Op. cit.*, p. 245.

[2] *Op. cit.*, p. 2. In reply to Talleyrand's remark, "Words are given to man to conceal his thoughts," he states, "but the language of the eyes does not lie." Talleyrand's phrase also suggests the waggish formula in answer to the query, "What is the difference between a diplomat and a lady," which runs: "If a diplomat says 'yes,' he means 'perhaps'; if he says 'perhaps,' he means 'no,' and if he says 'no,' he is no diplomat—if a lady says 'no,' she means 'perhaps'; if she says 'perhaps,' she means 'yes'; and if she says 'yes,' she is no lady."

[3] E. G. Boring and E. B. Titchener, A model for the demonstration of facial expression, *Amer. J. Psychol.*, 34, 1923, pp. 471–485. This can be purchased through the C. H. Stoelting Co., Cat. #24509.

tions in combination with other pieces (see Fig. 18). The unchangeable part of the head is 18 inches high and is permanently mounted on a background 21 by 24 inches in size. All parts of the face are made of plywood finished in black outlines on white paper treated with white shellac. The model is easily visible to a class of ·250. There are 360 possible combinations of which more than 24 suggestions are listed by formula in the original article referred to. In the present state of our knowledge of emotional classification many of the names given

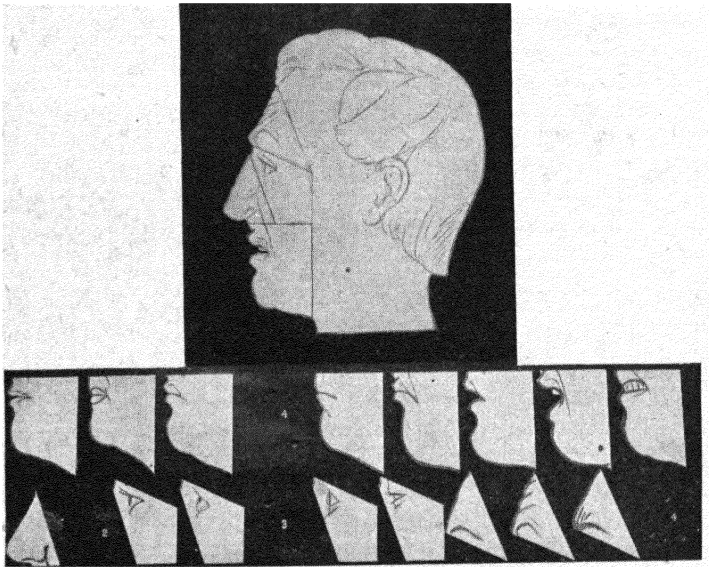


FIG. 18.—Boring and Titchener articulated facial profile. (*Courtesy of the C. H. Stoelting Company.*)

can be approximations only, but the results obtained are instructive to elementary classes and are serviceable by way of preliminary experimentation.

The authors of this Piderit demonstrational model were well aware of the limitations presented by the profile view. Certain significant facial expressions, like laughing and weeping, and Wundt's 'sour' mouth, were hard to reproduce. Guilford and Wilke therefore proposed an additional model showing the front face made again with changeable parts on the basis of the Rudolph sketches and the Ruckmick photographs.[1] There are six foreheads, nine eyes, four noses, and twelve mouths (see Fig. 19).[2] All told the combinations of these would number nearly three thousand, but, of course,

[1] These will be discussed later in the chapter.

[2] J. P. Guilford and M. Wilke, A new model for the demonstration of facial expressions. *Amer. J. Psychol.*, 42, 1930, pp. 436–439.

only a small group of these would be significantly useful. Since the parts of the face are numbered much in the same manner as in the Piderit model, the Boring-Titchener formulae may be followed. The model offers a wider range of expression, however, and has been found convincing, according to the authors, to those who have worked with it. They suggest two preliminary procedures: (1) the identification of each piece with its inherent significance in order to acquaint the subject with the necessary vocabulary of expression, followed up by a process of building up the rest of the face around some one significant part, like the 'sour' mouth; and (2) the definition of Allport's six attitudinal groups followed by the reconstruction of these six typical expressions and their variations. Allport's six groups are: (1) pain-grief, (2) surprise-fear, (3) anger, (4) disgust, (5) pleasure, (6) attitudinal expressions



FIG. 19.—Guilford's articulated full-face facial model. (*Courtesy of Dr. J. P. Guilford. Manufactured by the C. H. Stoelting Company.*)

largely involving cognitive elements like doubt, hesitation, questioning, and determination. A convenient table shown on page 250 gives a summary of typical expressions for each of the first five groups in connection with the various parts of the face.

The reader will notice that the outline is much abbreviated and also that each expression, thus compactly stated, is quite complex in terms of the actual facial musculature.

Recognizing that we are now supplied with large facial models that furnish demonstrational apparatus for depicting a considerable number of facial expressions from both the side and the front view, it might be instructive at this point to realize how the anatomical mechanisms provide the means of producing such varied indices of feeling and emotion in this portion of our organic structure. We should recall at this juncture that we are purposely dealing only with a restricted area of expression, even though it be an important one. The inflection

of the voice in singing and speech, the carriage of the head, the accompanying gestures, the gross posture of the body, for example, in supplication and abject contrition, the heaving of the chest, and the gait

OUTLINE OF FACIAL EXPRESSIONS[1]

	Pain and grief	Amazement and fear	Anger	Disgust	Pleasure (smiling and laughing)
Brows and forehead	Raised. Knitted. Oblique out and down. Wrinkles. h. v.[2]	Raised. Wrinkles h. (amazement). Terror as in pain	Lowered. Knitted. Oblique in and down. Wrinkles v.	Slightly knitted. Wrinkles v.	Smooth (except in violent laughing)
Eyes	Partly or fully closed (tears)	Wide open	Wide open	Varying. Usually narrow, resembling smiling	Partly shut. Lower lid raised. 'Crow's-feet'
Nose	Compressed (thinned). Elongated	Alae dilated (in terror)	Alae dilated (in rage)	Raised. Shortened. Wrinkled. Alae raised at sides	Natural
Mouth	Lowered. Open and skewed (in groaning)	Opened Wide and fixed (in strong fear)	Rectangular rigid opening, exposing lower teeth	Slightly elevated	Raised. Open, upper teeth shown (laugh). Closed (smile)
Lips	Depressed at corners. Lower lip trembling	Somewhat depressed at corners	Depressed at corners. Lower lip tense	Depressed at corners. Lower lip protruding	Corners drawn back and up. Upper lip raised, tense
Lower jaw	Drooping	Immovable	Rigid. Protruding	Raised	Dropped and trembling (in laughing)
Head	Sunk forward	Drawn back or averted	Advanced	Sometimes averted	Thrown back (in laughing)

[1] *Social Psychology*, p. 209.
[2] h. and v. denote 'horizontal' and 'vertical.'

or other movements of the legs have much to do in conveying emotional meaning from one individual to another. Not only motion but arrest of motion; not only saying something in whatever tone of inflection, but saying nothing, are in the frame of emotional communication. Then we must also not forget that while many of the more implicit and

internally manifested responses of the vasomotor and other types can be recorded only through the use of special apparatus and techniques, some of them are clearly noticeable to another person in the same way as are the facial movements. It has been remarked that the human animal has lost some of the more prominent tools of expression possessed by many of his relatives in the animal kingdom, such as the waggling of the ears and the wiggling of the tail. The hair no longer bristles, although 'goose-flesh,' which is genetically related, still persists, and the tail no longer tells a half-dozen or more different stories, but blushing and paling, weeping and dry staring, sweating, quivering, trembling, chattering of teeth, dryness of lips, and incipient frothing at the mouth are other symptoms of expression which are clearly visible and carry affective meaning.

A well-known psychologist remarked to the writer that the candidate whom we were examining for an advanced degree was frightened because she had dry lips. A student said that she knew that the taxicab driver was angry because he was red 'behind the gills,' and she herself flushed when embarrassed, not in the face or neck, but on the chest and shoulder blades! This was demonstrated to the writer in a laboratory experiment. We have all been impressed not only by weeping, but by 'fighting back the tears' and by almost glassy, dry eyes. While there is some individual variation in emotional expression, there is enough that is common to all of us so that we usually have no difficulty in reading at least many of the grosser symptoms. Sometimes we have to wait to become acquainted with another individual to know his emotional responses more surely, especially if voluntary control or personal technique has to be reckoned with.

Our primary aim here, however, is to deal with the facial manifestations. The other manifestations of emotional expression will receive further attention later on. It will therefore be instructive to consider for a moment the anatomical substructure which provides the mechanism of facial expression. This will help us to understand at once the complexity of the response and the inherited pattern which is involved. Due to the atrophy or feeble excitation of some of the muscles, we shall also appreciate all the more the unique ability of some actors and actresses to command these muscles in the voluntary exhibition of emotion.

5. The Anatomy and Physiology of Facial Expression.—Some notion of the extreme complexity of facial expressions may be gained from the number of separate muscular groups which are responsible for these expressions. In the human face many of these muscles are feeble and rudimentary in action. Besides, a certain amount of adipose and dermal tissue somewhat obscures them but also serves visually to

integrate the action of the various muscles. The muscles of the head as a whole may be divided into three separate categories: the superficial muscles, the muscles of the orbit of the eye, and the muscles of mastication. While the rolling and the fixation of the eyes is important in some of the emotional expressions, we shall not stress the muscles of the orbit any more than to say that there are six principal muscles involved in eye-movement: the *superior* and *inferior recti*, the *rectus lateralis*, the *rectus medialis*, and the *superior* and *inferior obliqui*. A seventh may be added, the *levator palpebrae superioris*, but it really belongs to the upper eyelid. The muscles of mastication proper do not concern us here, although the large *masseter* muscle is often classified as a superficial muscle and governs the movements of the mandible and cheek.

The *platysma* is a large thin sheet extending from the chest to the side of the neck and face. Its function is to depress the mandible, to retract and depress the angle of the mouth, and to flex the head laterally, sometimes throwing the skin of the side of the neck into folds. Another large sheet muscle is the *epicranius*, or *occipito-frontalis*, the front portion of which governs the muscles of the forehead and thereby throws the skin of the forehead into parallel folds, exhibiting the 'wrinkled brow.' This part also helps to raise the eyebrows. Other superficial muscles govern the movement of the ears, but they are usually rudimentary in function.

Continuing with the superficial muscles of the face, we may conveniently divide them into those associated with the eye, the nose, and the mouth. In the first group we find the muscles of the eyelids, which comprise four groups: the *levator palpebrae superioris*, the *orbicularis oculi*, the lacrimal portion of the *orbicularis*, and the *corrugator supercilii*. The first of these raises the upper eyelid and antagonizes the action of the second. The second of these is of the sphincter type, surrounding and occupying the eyelids, and can be divided into coarser and finer fibers. It closes the eyelids and lowers the eyebrows, sometimes causing a wrinkling of the upper eyelid and also 'crow's-feet' at the temples. The third encloses the canals of the lacrimal sac, thus, together with the *orbicularis oculi*, in which the lacrimal sac itself lies, governing the secretion of tears. The action of the fourth throws the skin of the forehead into vertical folds, as in frowning, and pulls the central half of each eyebrow upward, as well as toward the median line of the face.

The muscles of the nose comprise five small, feeble muscles and one associated with both nose and upper lip. They are the *procerus* (*pyramidalis nasi*), *nasalis* (*compressor naris*), *dilatores naris*, anterior and posterior (*depressor alae nasi*), and the angular head (*caput angulare*) of the *quadratus labii superioris* (also called *levator labii superioris alaeque nasi*). The first one pulls down the inner angle of the eyebrows and transversely wrinkles

the top of the nose, as in frowning. The second shortens the nose and tends to pull it up. The third distends the nostrils, as in ferocious anger. The fourth tends to draw the nose downward and to narrow it. The last muscle tends to shorten the nose and broaden the nostril, as in the expression of contempt.

The muscles of the mouth are the most complex of all. All except one, which is of the sphincter type, are bilaterally arranged. They are: (1) *quadratus labii superioris*, which includes the angular head, or *caput angulare*, discussed under the muscles of the nose, the infra-orbital head, or *caput infra-orbitale* (*levator labii superioris*), and the zygomatic head, or *caput zygomaticum* (*zygomaticus minor*); (2) the canine muscle, or *caninus* (*levator anguli oris*); (3) *zygomaticus* (*zygomaticus major*); (4) *risorius;* (5) *orbicularis oris;* (6) *triangularis* (*depressor anguli oris*); (7) *quadratus labii inferioris* (*depressor labii inferioris*); (8) *mentalis* (*levator menti*); (9) *buccinator.*

The functions of these muscles are in some cases exceedingly complex, since parts or bellies of the entire muscle may be slightly moved separately. This is the case with the sphincter muscle *orbicularis oris*, which forms a circular band around the mouth and is continuous with other muscles converging to the mouth. Its action depends upon the degree of contraction of its constituent elements causing a general compression and closure of the lips, tightening the lips over the teeth, contracting them as in kissing, or causing pouting or protrusion of one lip or the other. Determination can also be expressed through its action. The *quadratus labii superioris*, in its several parts, governs the movement of the upper lip, the second part raising and slightly protruding it and the third part drawing the upper lip backward, upward, and outward, as in the expression of sorrow. Besides the action of this group of muscles, the canine muscle and the *zygomaticus* raise the corner of the mouth and draw it inward, or backward, and upward, as in smiling or grinning. Unpleasant sarcastic laughing, or broad grinning, is chiefly caused by contraction of the *risorius*. The *mentalis* wrinkles the surface of the chin and is active in the protrusive quivering of the lower lip, as in the expression of disdain. The *buccinator* retracts the angles of the mouth and flattens the cheeks and brings them in contact with the teeth. It is also used in blowing up the cheeks.

There are also two depressor muscles, the *triangularis*, which pulls down the corners of the mouth in opposition to the *levator* muscle, and the *quadratus labii inferioris*, which pulls the lower lip downward and outward, as in ironical expressions. It has often been remarked by sculptors and painters in connection with the muscles of the mouth that the muscles of smiling either derisively or joyfully (*risorius, zygomaticus*) lie close to the muscle which helps express sorrow (*caput zygomaticum*).

We have left still more general muscles which must not be overlooked. The posture of the head as a whole is regulated by large muscular groups, shown in the diagram (Fig. 20), in the region of the neck. There are also more deeply seated muscles used in mastication, which can not be easily shown in the diagram and which have much to do with setting the jaw in expressions of conviction or determination and allied feelings and attitudes. These are all recalled here because, in the photographs of facial expression discussed later, the carriage of the head, or its obverse, the hanging of the head, does much to register the feelings.

It is clear from the foregoing that the mechanism of expression is inherently complex and for the most part reflex. In the training

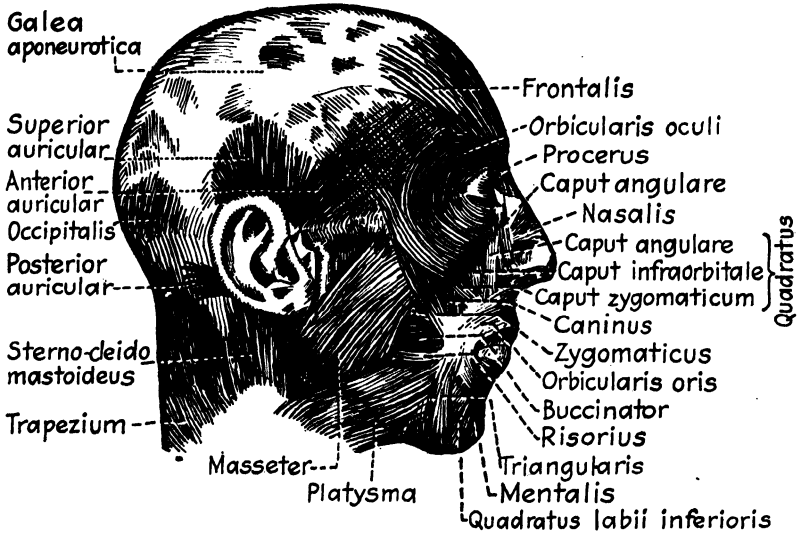


FIG. 20.—A profile view of the head showing the principal muscles of facial expression and head movement.

prescribed for actors and public speakers many of these reflexes become voluntarily controlled. The material here given, though physiological and anatomical in type, also serves to explain why many of the emotions have in them experienced items of strain and tension, or of kinaesthesis in general, localized in various positions of the head.

6. Investigations with Photographic and Demonstrational Models of Facial Expression.—We are now ready to discuss the problem of facial expression from the point of view of photography as well as from the angle of the two sets of models already mentioned. Duchenne had produced controlled facial expressions by means of electrical stimulation of comparatively simple muscular fibers in an older man as subject, but he also used photographs made from natural expressions. Darwin

used these together with many others obtained through the services of actors. He probably was the first investigator to carry on detailed research in this field. He showed a number of these to groups of about twenty adult subjects and obtained under his somewhat uncontrolled conditions a fairly uniform result in the naming of these emotional expressions. Often, however, they included other portions of the body.

Probably the first investigation of facial expression in this country was made by Feleky.[1] Out of several hundred photographs of a female subject registering a great variety of typical emotions and affective conditions, eighty-six were selected and presented to one hundred competent persons. The photographs show a variation in dress and also occasionally included manual gestures. A tabulated list of expressive terms was given to the observers, which terms they were required to write opposite the appropriate numbers representing the photographs. They could also add their own descriptive names. An introspective account was called for. The experimenter obtained no definite results, but hoped to arouse interest in this type of study. She did note, however, that the results were variously distributed. Not only was the same photograph quite differently described but the same descriptive term was often given to a number of different photographs. This the investigator attributes in part to ignorance of the meaning of the portrait but also to ignorance of the accepted meanings of the terms used.

'Surprise' was the most successful portrait, drawing fifty-two votes, with a heavy vote for 'wonder' and 'astonishment' in the same group. The next highest number of votes given was forty votes for 'laughter,' with also a high concentration on terms like 'glee,' 'ecstasy,' 'merriment,' and 'rapture.' A high vote is also registered for 'disgust.' In fact this entire group, including 'sneering,' 'contempt,' and 'aversion,' obtained a heavy ballot. The next highest was for 'horror,' with high distributions against the terms 'terror,' 'fury,' and 'fright.' Then in order of consistent response came 'physical suffering,' with also a strong vote for 'mental suffering,' 'worry,' 'pain.' An equal vote was returned in connection with the term 'suspicion,' with fairly heavy votes on 'timidity' and 'distrust.'

Langfeld[2] selected 105 of the best portrait drawings contained in the Rudolph[3] collection of 680 and asked for judgments

[1] A. M. Feleky, The expression of the emotions, *Psychol. Rev.*, 21, 1914, pp. 33–41.

[2] H. S. Langfeld, The judgment of emotions from facial expressions, *J. Abnorm. Psychol.*, 13, 1918–1919, pp. 172–184.

[3] *Op. cit.*

from four men and two women on two separate occasions, after which they were given the judgments of all the observers and also the original translated names of the facial expressions. There was a considerable diversity of opinion concerning the portrayal of 'amazement, doubtful.' Out of the twelve judgments, only four times was 'amazement' or 'surprise' detected. The 'anger' picture called out the feeling of 'pain,' 'distress,' 'tormented fear,' and 'grief' more frequently than the aggressive attitude of 'anger.' Unqualified 'hate,' on the other hand, was frequently judged as 'anger.' The 'aversion' and 'distrust' group generally conveyed the intended attitude. 'Laughter' is probably depicted and also judged more readily than any other expression of emotion. In addition to some of the more outstanding emotions, a number of moods like 'sullenness' and 'peevishness' were also correctly interpreted. Although 'anger' and 'fear' seemed to be interrelated they were, nevertheless, fairly easily interpreted. The 'contempt' and 'scorn' group, as in the Feleky results, was unmistakably depicted.

Since it turned out from Langfeld's previous experiment that those who judged emotional expressions from portraits were open at times to suggestion, Langfeld proceeded to investigate this factor of suggestion in connection with the Rudolph atlas of portraits.[1] One hundred and five of the most suitable pictures were selected for the experiment. They included a wide range of emotional expression but included also a few portrayals of moods, bodily pain, and sensations of smelling and tasting. Five advanced students with experimental training were used as observers. The picture was shown to the observer and he was asked to write down his judgment of the expression. Afterwards he was told the artist's title for the picture and at another time an incorrect title was given. Sometimes the incorrect title was given at the first showing, sometimes at the second. Out of a total of 190 approximations to the true title, only 7 of the artist's titles were disapproved and of the 183 already approved, the suggested wrong title was accepted 34 per cent of the time. The 'distrust' group of emotions offered the greatest opportunity for suggestion with the 'aversion-hate' group next. With 'anger' and 'rage' suggestion had no effect.

A large individual difference was noticed among the observers in their ability to read faces. The poorest observer was highly suggestible, accepting 65 per cent of the wrong titles shown him, as well as 92 per cent of the book titles. Langfeld says of him that he "is the least discriminating, accepting almost every title shown him, that is, 80 or 90 per cent of the titles suggested for the 87 pictures," which had previously not been approximated. On the other hand, one subject

[1] H. S. Langfeld, Judgments of facial expression and suggestion, *Psychol. Rev.*, 25, 1918, pp. 488–494.

was the least suggestible of all. "There is a suspicion that he is of the negative suggestible type." It is proposed that a battery of 14 of the best pictures be selected as a test for individual differences in ability to read emotional expressions from portraits.

In some preliminary experiments, the writer[1] undertook to test the reaction to a series of facial expressions photographed by him under laboratory conditions of control. The face of a talented amateur actress in front view was used and photographed in a darkroom under artificial daylight illumination. The background and the attire were kept constant and unobtrusive The expression was confined to the face, although occasionally the model aided herself in the expression through the use of her hands and other parts of the body. A set of thirty-five photographs emerged (see Fig. 21).[2] Observers were required to name the expression and to note any reflected feelings in themselves. The descriptive terms used varied from observer to observer. Bodily pain and joyful laughter were most consistently reported. A part of this diversity was found to be due to the limitations of vocabulary in some cases. The primary emotions were more easily detected than those that are usually classed as secondary, like 'repulsiveness,' 'surprise,' 'distrust,' and 'defiance.' There was also considerable difference among the observers in the manner in which they integrated the perceived face with imagined surroundings or circumstances attending the expression. A provisional survey likewise revealed differences in interpretation from day to day as conditioned by the observer's own mood or disposition.

In one of Landis's early experimental studies he asked his observers to be seated as naturally as possible and neither to try to be emotional nor to show an 'expressionless' face, but simply to act naturally.[3] A list of terms was then handed the observer for each situation and he was asked to check the corresponding feeling which he experienced. The situations ranged from a presentation of classical and jazz music, pictures of various sorts, including nudes, religious subjects, vulgar pictures of direct sex appeal, illustrations of horrible conditions in connection with diseases in China, odors, a bucket of live frogs, and electric shock. At the same time the observer's face was photographed from another room. In a subsequent series particularly suitable observers were asked voluntarily to express or register: (1) 'abstraction' and 'contemplation,' (2) 'pep' and 'interest,' (3) 'lust,' (4) 'religious

[1] C. A. Ruckmick, A preliminary study of the emotions, *Psychol. Monog.*, 30, 1921, No. 3, pp. 30–35.

[2] Key to the intended expressions portrayed are: (1) sorrow, (2) mirth, (3) scorn, (4) anger, (5) maniacal fear, (6) joyousness, (7) anguish, (8) apprehension, (9) startled fear, (10) torturous suspense.

[3] C. Landis, Studies of emotional reactions, I. A preliminary study of facial expression, *J. Exper. Psychol.*, 7, 1924, pp. 325–341.



(1)



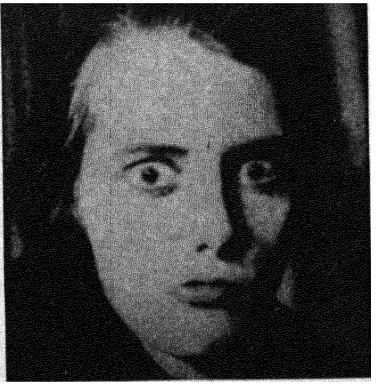
(2)



(3)



(4)



(5)

FIG. 21.—From the Ruckmick series of facial expressions. Index is to be actress at the University of Illinois. (*Courtesy of*



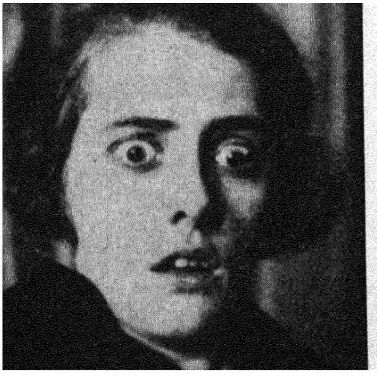
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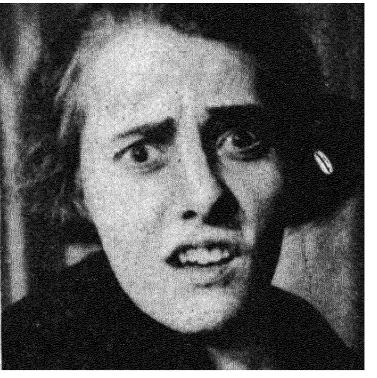
(7)



(8)



(9)



(10)

found on p. 257 (footnote). Dramatized facial expressions modelled by an amateur *the C. H. Stoelting Company, Chicago, Illinois.*)

feeling,' (5) 'disgust' and 'repulsion,' (6) 'pain' and 'fear.' The author notes that expressive reactions were exceedingly variable. The reproduced photographs, on the whole, are not very clear as regards the face, since in general a three-quarter view was taken and the lighting conditions were not constant. Perhaps one of the most specific analyses was made in regard to pain, which was photographed as the partial closure of the eyes, the fall of the lower jaw, and the contraction or partial contraction of many other facial muscles. But this expression could not be voluntarily produced in anything like so intense a manner with his observers as an actual stimulus produced it. The voluntary production of emotional expressions, this investigator thought, resulted in traditional expressions rather than those that were actually obtained in emotional situations.

In another study[1] a number of well-controlled records were taken of systolic blood-pressure and respiration, while the observers were put under a variety of emotional situations ranging from the hearing of music, reading from the Bible, smell stimuli, loud noises, pornographic pictures and artistic studies, illustrations of morbid skin diseases in color, mental multiplication, and electric shocks. Landis noted that among the twenty-five subjects tried, of whom twelve were women, twelve men, and one a boy, the attitude with which they entered into the experiment was an important factor in the results. Some began literally 'in fear and trembling,' others with the 'show-me' attitude, and still others in a passive 'goat being offered for sacrifice' manner. Most of the subjects, however, yielded to emotional disturbances which gave some index to the effectiveness of the series. While the observers were thus undergoing the emotional experience, photographs of their facial expressions were again taken from another room. Burnt-cork marks were made on the face, which was photographed with reference to a screen of one-half-inch lattice work held first in front of the subject's face and then at the side while the pictures were being taken, in order to provide a scale of objective measurement of the various muscular groups. These photographs were then carefully analyzed with respect to the movements of muscles. An introspective account of sensations and feelings experienced was called for after the experimental series. But Landis was of the opinion that "for the solution of the problem introspection seems of little value and the final answer must be determined by the study of physiological reactions of the individual to determine whether or not any constant types either of neural or motor responses can be demonstrated." He discovered, however, that the individual tended to use certain muscles, muscular groups, or expressions in the majority of his expressive reactions to the exclusion of other muscular groups and that there were marked individual variations in the expressive patterns thus produced. In no situation did this contraction occur with

[1] C. Landis, Studies of emotional reactions, II. General behavior and facial expression, *J. Comp. Psychol.*, 4, 1924, pp. 447–509.

sufficient frequency to be significant for that situation. This was likewise true for the verbal introspective reports or for the imagined emotional situations. In the order of the amount of expressive facial movement in decreasing order, the affective experiences run: 'pain,' 'surprise,' 'anger,' 'exasperation,' 'crime,' 'disgust,' 'sexual excitement,' 'repulsiveness.' Some degree of 'smiling' was found to be the most common form of facial reaction occurring in 34 per cent of the photographs. Asymmetrical expressions of emotion almost never occurred. A curious sex difference was discovered: the men were on the whole more expressive than the women, tending to react more violently with 'anger' and 'profanity,' where women cried and pleaded. Landis suggested that "the basis of distinction between emotions rests in the nature of the situation calling out the emotion and in the degree of general disturbance rather than in any specific differences in bodily or subjective reactions."

Using seventy-seven photographs from his earlier set, Landis found no greater accuracy than chance in the judgment of observers as to what emotion the faces expressed. He interpreted his results, which are at variance with several others including our own, by remarking that, in addition to the description of the facial expression as a behavioral pattern, an interpretation of the surroundings or situation as part of the environment of the organism adds significant meanings. In view of the more consistent results obtained from other sets of facial expression, the fact must not be overlooked that the Landis set presents neither clear facial expression nor, of course, a picture of the surrounding environment or social situation. Hence, being neither here nor there, the ambiguity of his results was to be expected.[1]

Using the Boring and Titchener demonstrational model of the changeable Piderit face, Buzby[2] experimented on 716 students including both men and women in order to determine the amount of scatter which one would obtain from judgments on several of the typical faces. Numbers 11 ('dismayed'), 17 ('bewildered'), 19 ('anger' and 'horrified'), 22 ('disdainful'), and 24 ('disgusted') were used.

He found that for the portrayal of 'anger' and 'dismay' the scatter was great and the corresponding number of correct judgments was small. 'Anger' was judged most frequently as 'pleased' and quite frequently as 'bewildered,' 'quizzical,' 'contemptuous,' 'amazed,' or 'disdainful.' 'Dismayed' was judged as 'attentive' with a very high frequency (over 46 per cent) and 'quizzical' and 'bewildered' were judged more frequently than the intended 'dismayed.' But for all the other four places the intended emotion had a high frequency: 'horrified,' 60 per cent; 'disgusted,' 53 per cent; 'disdainful,' 37 per cent; 'bewildered,' 37 per cent.

[1] C. Landis, The interpretation of facial expression in emotion, *J. Gen. Psychol.*, 2, 1929, pp. 59–71.

[2] D. E. Buzby, The interpretation of facial expression, *Amer. J. Psychol.*, 35, 1924, pp. 602–604.

The results distributed by sex gave a slightly greater percentage of right judgments for the women, both in the early years of their college course and later. A slightly greater percentage of correct judgments was also obtained in the case of those who reacted during their early years of college training. Although the differences were not great in any case, the tendencies seemed to be indicative without exception.

In an analysis in terms of the parts of the face, this model showed a greater importance in the direction of correct judgment attached to the upper part of the face, eye, and brow than to the mouth. For the six models used the following table shows the total number of judgments for the facial expressions in which the correct individual feature was contained:

	Anger	Dismay	Horror	Disdain	Disgust	Bewilderment
Mouth	36	189	439	413	613	308
Eye	106	47	560	497	664	570
Brow.	106	61	560	507	700	576

This is opposed to some preliminary findings by Ruckmick,[1] in which fifteen portraits from the Rudolph collection were used. The face was divided into three sections showing only eyes in one case, the nose and lines about the nose in another, and the mouth in the third. In still another series the faces were divided into upper and lower halves. The lower half of the face in all cases gave the best cues for interpretation. Then in order came the eyes, the upper half of the face, the mouth, and finally the nose and the lines about the nose. This series was repeated with the author's collection of thirty-five portraits with approximately the same results. Precautions were taken in arranging the series so that memory of previous results could not influence subject judgments. Dunlap obtained somewhat similar results in a study which is summarized below.

Believing that the Boring and Titchener model of the Piderit face had much more validity for demonstrational purposes than Buzby's results might indicate, Jarden and Fernberger[2] proceeded to repeat his experiments, using two degrees of suggestion in addition to the list of eighteen terms submitted by Buzby to his observers. There were two parts to the experiment. Judgments were obtained in the first part from 995 male and female graduate and undergraduate students in the courses in psychology. They were told that they would be

[1] *Op. cit., Psychol. Monog.*, p. 33.

[2] E. Jarden and S. W. Fernberger, The effect of suggestion on the judgment of facial expression of emotion, *Amer. J. Psychol.*, 37, 1926, pp. 565–670.

successively shown six faces, each one representing the expression of an emotion. They were asked to record (1) whether the face represents the emotion, and (2) if it is correctly represented to indicate whether it was a 'poor,' 'fair,' or 'good,' representation. In the second part of the experiment, conducted four months later, the same faces were shown to 891 students, for the most part the same group as before, and they were given the same instructions. In addition, one of the experimenters, who had a special aptitude for this sort of thing, first assumed the mimic and pantomimic expression of the emotion before the group, analyzed the expression with respect to brow, eyes, nose, and mouth, and then built up the model face to correspond to this analysis accompanying it with verbal explanations. This was intended to be the highest form of possible suggestion.

The following table gives the comparative results obtained in the two parts of the experiment and in the Buzby study. 'Named' refers to the first part of the Jarden and Fernberger study and 'analyzed' refers to the second part.

PERCENTAGE OF CORRECT JUDGMENTS

Expression	Buzby	Named	Analyzed
Anger .	2	36	56
Dismayed	6	80	86
Horrified	63	98	95
Disdainful	37	98	98
Disgusted	53	99	99
Bewildered	36	96	96

The authors concluded that with suggestion the demonstrational value of the model is considerably increased except for 'anger' and 'dismayed,' which "can not be brought to a high enough percentage of correct judgments to be adequate for demonstrational purposes no matter what degree of suggestion is used." In case of 'anger' and 'dismayed,' the amount of increase of correct judgment is progressive with increasing degrees of suggestion. In the case of the other four emotions, the mere mention of the name is sufficiently suggestible to give them almost unanimous recognition. The authors further analyzed their results with respect to sex and psychological sophistication. With the degrees of suggestions which they used, the authors found no difference for the respective sexes or for degrees of psychological naïveté or sophistication.

In a further study, Fernberger investigated the three types of control above mentioned with six new faces from the Piderit model. They were

'amazed,' 'attentive,' 'quizzical,' 'contemptuous,' 'stubborn,' and 'reverential.' The last four were correctly checked more often than any other term in the list. But 'horrified' and 'dismayed,' which appeared in the list of names, were checked more often than the correct term. 'Amazed' and 'bewildered' were likewise checked more often than the correct term 'attentive.' The highest percentage of correct judgments was for 'reverential' (less than 50 per cent). He found the same scatter for the new set of expressions that Buzby found for his set: for 'quizzical,' 'amazed,' and 'reverential.' Every one of the eighteen terms was checked at least once; for 'attentive' and 'stubborn' seventeen were checked; and for 'contemptuous' sixteen were checked. The rank order of excellence, based upon frequency of correct judgments from best to poorest is: 'reverential,' 'stubborn,' 'contemptuous,' 'quizzical,' 'attentive,' and 'amazed.' On the whole the six new faces confirm the previous results of Buzby and of Jarden and Fernberger. The results held for either sex and for all degrees of psychological sophistication. The only expression which improved with the highest degree of suggestion in this case was the 'attentive' face. The reason that the 'attentive' face increased its rank considerably with the highest form of suggestion was due, in the experimenter's opinion, to the poor mouth which it contains. The influence of suggestion, such as the naming of the expression and the analysis of the face, increased considerably the percentage of correct recognitions of these faces.

A number of interesting pictures of emotional and affective portraits of the front face of both men and women have been supplied by Dunlap.[1] The question of the peculiar function of the eyes as compared with that of the mouth is answered in favor of the mouth. Although our language is full of such expressions as 'laughing eyes,' 'merry eyes,' 'a grieved look in the eyes,' the muscles about the mouth are biologically significant because they have to do with the seizing, preparation, and ingestion of food. There is at least the presumption that they should be more important muscles of expression than those surrounding the upper part of the face. He first tried out covering up the respective parts of the face but, realizing that this does not give results comparable with those referring to the whole face, he proceeded to cut each print into two parts horizontally through the bridge of the nose. The photographs were taken under eleven different situations. They were (1) natural, (2) amusement, (3) mirth, (4) startle, (5) expectation, (6) pain, (7) disgust, (8) grief, (9) strain, (10) relaxation, and (11) solving mental arithmetic. Fifty men acted as observers. They were required to characterize the original expression and to determine for each of the two composites which of the two originals it

[1] K. Dunlap, The rôle of eye-muscles and mouth-muscles in the expression of the emotions, *Genet. Psychol. Monog.*, 2, 1927, pp. 199–233.

most closely resembled as an emotional expression. The composites were neatly assembled in the form of lantern slides and were so skillfully made that often the eyes of a woman's face could be combined with the mouth of a man, or *vice versa*. A list of about thirty-five terms was offered to the observers for their use, but they were free to use their own words if no satisfactory terms or combination of terms could be found in the list.

The results showed that the mouth muscles were predominantly the determining factor. In the case of twenty of the thirty-five slides 80 per cent or more of the judgments ascribed the expression of both of the composites to the original from which the mouth was taken. For the remaining fifteen slides, containing thirty composites, four of the composites were ascribed to the original from which the mouth was taken by 80 per cent or more of the judgments; six by 75 per cent or more; fourteen by 60 per cent or more; four by 50 per cent or more; and two by less than 50 per cent. The mouth predominated over the eyes in the following expressions, 'natural' with 'amazement,' 'pain,' and 'mirth'; 'amusement' with 'natural,' 'startle,' 'strain,' 'relaxation,' and 'mental mathematics'; 'mirth' with 'natural,' 'startle,' and 'disgust'; 'strain' with 'amusement,' 'pain,' and 'startle'; 'relaxation' with 'amusement'; 'pain' with 'natural,' 'startle,' 'disgust,' and 'strain'; 'disgust' with 'mirth' and 'pain'; 'startle' with 'amusement,' 'mirth,' 'pain,' and 'strain'; 'expectation' with pain.'

Dunlap suggested the possibility of motion pictures in order to give the progress of such expressions as those of 'smiling,' 'laughing,' 'weeping,' and the like, and he realized also the inadequacy of crude cross-sections of facial expression. He also suggested that perhaps eye muscles may express other emotions than those which he investigated.

White and Landis[1] have devised a clever apparatus for the production of silhouetted forms of the profile. Through systems of simple curved levers, whose positions may be read off on suitable scales, a movable brow, nose, and chin are provided. The figure is apposed to a permanent profile facing it. The authors conducted some preliminary investigations which were divided into two parts. There were forty observers, including a group of ten children from four to nine years of age and ten college students, seventeen to twenty-two years of age. A similar set was used in a second series with a similar set of new observers.

First the author discovered the least perceptible difference in the adjustment of each part of the face for his various observers. In the second series

[1] R. K. White and C. Landis, Perception of silhouettes, *Amer. J. Psychol.*, 42, 1930, pp. 431–435.

the observer was given six definite standardized adjustments. He was then asked: "Do you see any difference?" "Any other difference?", and so on until he answered: "No." A number of other questions were also asked regarding pleasantness of expression, intelligence, and other personal attributes that could be assigned to the profile. A manipulation of the model was also provided to indicate whether any further changes could be noticed when five of the twelve adjustments made the two silhouettes look exactly alike. The factor of suggestibility was investigated in this procedure.

The experimenters discovered that usually unpleasant adjectives were attributed to any profile which deviated markedly from the standard. The affective attributes, however, were usually combined with others, like intelligence and superficial personal attractiveness. They found also a variation in the least perceptible difference for the top of the forehead (6.4 mm.); for the tip of the nose (2.3 mm.); and for the bottom of the neck (6.1 mm.). The difference between the least perceptible difference of children (8.88 scale units) and that of adults (4.47) was tentatively explained by the fact that children were less attentive. They were also 100 per cent suggestible. The authors offer their results and the model for further corroborations. Undoubtedly there are important phases of recognition to be more accurately determined at the same time. The device suggests a number of possibilities for psychophysical investigations and as a test for individual differences in the recognition of human profiles.

Another recent study was made by Frois-Wittmann,[1] in an attempt to determine objectively: (1) the relationship of judgments of facial expressions to each other and to the muscular development of the face and (2) the relationship of the several features of the face to each other with a view to discovering what factors and principles are effective in differentiating conventional facial expressions.

The observers were asked to judge the expression from 46 photographs selected from 120 that had been used in a preliminary experiment. The face was fairly neutral, smoothly shaven, so that the musculature was easily visible, and there was no indication of clothes or distortion of the hair. But for the main experiment a series of 59 composite drawings was used. Altogether there were 227 pictures and fragments of pictures, 46 photographs, and 59 drawings of the whole face; 84 photographs and 38 drawings of eyes and mouths. The experiment was very well controlled throughout as far as exposure was concerned and the observers were left to use their own terminology. An interesting chart is presented showing the interrelations between various emotions from 'attention,' on the one hand, through 'interest' and

[1] J. Frois-Wittmann, The judgment of facial expression, *J. Exper. Psychol.*, 13, 1930, pp. 113–151.

'reflection' to 'laughter' and 'pleasure,' on the other. The different expressions were analyzed in regard to muscular involvements. The frequency for the 'frowning' brow, for instance, was found to be 100 per cent in all pictures judged as 'rage,' 'anger,' 'hate,' *etc.* In all pictures judged as 'rage,' the raised brow occurred in 50 per cent and raised upper lid in 100 per cent. There were also a number of sample photographs of facial expressions and sample drawings. A chart showed the facial points for the parts of the face which function in various degrees.

The author concluded that the significance of a given muscular involvement is not constant as regards any part of the face, but is relative to the rest of the pattern, so that there were frequent disagreements between the judgments on the face as a whole and on its separate features. Also some agreements were found between judgments based on parts of the face and on the face as a whole. The whole face agreed with the eyes in the case of 'anger,' 'fear,' 'anxiety,' 'reflection,' 'doubt,' and 'grief'; the whole face agreed with the mouth in the case of 'superiority,' 'sulkiness,' 'contempt,' and 'crime.' Many other interesting analyses were also made. On the whole, the study departed from the traditional view as stated by Piderit and others that expressions have fixed patterns, or the view as attributed to Duchenne and Dumas that each expression is distinguished by a specific contraction of some one muscle or muscular group.

These studies have been given in some detail as typical illustrations of the various problems which have arisen and the apparatus and procedures that have been developed to solve the issues which have been raised. The reader must be impressed with the fact that many interesting questions have not received definite answers. But we must not lose hope in the possibility that more unequivocal results will soon be forthcoming. We are beginning to see that, as in the case of other complicated problems, the separate factors which play a major rôle must be analyzed. There can be little doubt that some of the more fundamental emotional expressions of the face, like 'anger,' 'physical pain,' 'fear,' and 'joy,' have at least a stereotyped framework upon which we can rely for interpretation. When uninhibited they are common to the two sexes and to all peoples the world over. Many of them are represented in the lower animal series, but here, too, we must be cautious. Often in the more popular magazines 'laughing' chimpanzees, hyenas, and other animals are portrayed, when as a matter of fact the animal with such an expression is really enraged and ready to bite. Further studies should take into account the facial expressions of various races, tribes, and national types, for often prominent cheekbones, teeth, and lips, to say nothing

of characteristic eyes and skin color, have much to do with favoring some expressional interpretations over others (see Fig. 22). Then there is always with us the question of modification of expression with the sanctions and taboos of the local culture in addition to the general effect of voluntary control with age, except under the most unusual and infrequent conditions of life.



FIG. 22.—Joy expressed by Alnadlunguak, a girl from the polar eskimo group. (*Courtesy of the American Museum of Natural History and Prof. W. Elmer Ekblaw.*)

Two serious obstacles still confront us, however. One is the fact that a really adequate set of facial expressions of both men and women in a very wide range of emotional expressions is not yet available. Such a set requires (1) expert actors and actresses who have succeeded in registering a great variety of facial expressions, (2) efficient photographic technique to bring out these expressions to the fullest extent with a minimum of distracting influences, such as background and clothing, and under the best of uniform illumination, and (3) careful direction on the part of the psychologist who knows his field and the improvements that are desirable and promising of result. The other

difficulty lies in the direction of vocabulary. It is not certain that an inability to find the proper word with which to designate an expression means an inability to recognize the emotion expressed. As with other linguistic tests, and in fact as with conversational speech, the opposite often holds: "I can't express it clearly, but you know what I mean!"

Dashiell succeeded in eliminating the difficulty of vocabulary especially in the case of children by supplying a narrative with each series of facial expressions and by asking the children to pick out from the series the appropriate picture for each incident in the story. A better correspondence as to the order of difficulty of judging the various emotions was thus obtained. There was also a better differentiation of ability at the various age levels and a greater ability on the part of the younger children to discriminate between the subtler emotions.[1]

Emotions, like music, do not usually lend themselves to the precise conveyance of meanings; only a general effect is sufficient. Emotional expressions, unlike words, especially scientific terms, transmit meanings only in the rough. It could not well be otherwise, for the general features of each emotional expression must needs be inplanted upon a variety of facial landmarks that show a wide range of individual differences. We must also take into account the fact that these individual differences in the basic structure of the face may themselves denote certain set dispositions and habituated emotional attitudes in the individual's mental life. Thus may the temporary emotional expression be doubly confounded. As in the case of the cockney cabmen who were exchanging blows, these superimposed or average impressions are sometimes subject to misinterpretation. "You gave me a nasty look." "You've got a nasty look," said the other, "but I didn't give it to you." Besides, the terminology of emotional expression is itself at present in a very unsatisfactory condition and further study is needed to give the descriptive terms more accurate significance. Only concentrated and continued work will remove these two obstacles and develop an analysis of the various other factors which operate to obscure the present complex problem of facial expression.

7. Discussion of Results Obtained in Studies of Facial Expression. One of the persistent questions which we encounter in this field is the relation of general and social intelligence to facial expression. As we have already indicated, Paterson has clearly shown that the face is itself no reliable index to the intelligence of its owner.[2] This relates

[1] J. F. Dashiell, A new method of measuring reactions to facial expression of emotion, *Psychol. Bull.*, 24, 1927, pp. 174–175.

[2] Some of the more important references bearing on this question follow: L. D. Anderson, The estimation of intelligence by means of printed photographs, *J. Appl.*

probably to its approximately static condition as revealed in a still photograph or in a momentary glance. A number of studies have also brought out that the correlation between the ability to recognize emotional expression and general intelligence is not significantly high.[1] This present tentative conclusion is surprising both in view of the fact that the intelligence tests, as a rule, and the tests of recognition of facial expression have a common linguistic element and also from the angle that a number of studies have fairly definitely shown that the ability to recognize these expressions increases with mental age and sometimes even with chronological age.[2] Then, too, a number of researches have reported increase in the ability through coaching, training, or suggestion. Jenness admitted that certain primary emotional expressions are practically universal, while the finer nuances of meaning like 'doubt,' 'misgiving,' 'scorn,' and some of the milder forms of the primary group, are less easily and less uniformly recognized. He corroborated this point on the basis of studying the expressions of primitive peoples and those of cultures foreign to North America in comparison with those of different parts of the United States. A certain degree of cultural modification may step in where the basic stability of the expression through involvement with autonomic and visceral responses has not been biologically attained.[3] Guilford also found that training to read faces affords marked improvement in the ability which substantiates the result of Fernberger and others as well.[4] Fernberger went so far as to state that the emotion can not be reliably recognized from the facial expression alone, but that the stimulating

Psychol., 5, 1921, pp. 52–155; P. C. Gaskill, N. Fenton, and J. P. Porter, Judging intelligence of boys from their photographs, *J. Appl. Psychol.*, 11, 1927, pp. 394–403; R. Pintner, Intelligence as estimated from photographs, *Psychol. Rev.*, 25, 1918, pp. 286–296; D. V. Pope, The interpretation of the human face from photographs, *Bull. Randolph-Macon Women's Coll.*, 8, 1922, No. 4, pp. 3–17.

[1] A. F. Jenness, *Experimental Studies of Response to Social Stimulation, doctorate thesis, Syracuse Univ. Lib.*, 1930; L. Kanner, Judging emotions from facial expressions, *Psychol. Monog.*, 41, 1931, No. 3, pp. 1–94; W. N. Kellogg and B. M. Eagleson, The growth of social perception in different racial groups, *J. Educ. Psychol.*, 22, 1931, pp. 367–375.

[2] This was the result of G. S. Gate's investigation with the Ruckmick portraits, An experimental study of the growth of social perception, *J. Educ. Psychol.*, 14: 1923, pp. 449–461.

[3] A. Jenness, The effects of coaching subjects in the recognition of facial expression, *J. Gen. Psychol.*, 7, 1932, pp. 163–178; Differences in the recognition of facial expression of emotion, *ibid.*, pp. 192–196.

[4] J. P. Guilford, An experiment in learning to read facial expression, *J. Abnorm. & Soc. Psychol.*, 24, 1929, pp. 191–203; S. W. Fernberger, Can an emotion be accurately judged by its facial expression alone?, *J. Crim. Law & Criminol.*, 20, 1930, pp. 554–564, Six more Piderit faces, *Amer. J. Psychol.*, 39, 1927, pp. 162–166.

situation, which lies behind the facial expression, gives the decisive cue to social meaning. As the writer stated in his own investigation and as Frois-Wittmann found from another angle, the meaning of the face is given in either a perceived or an imagined setting, which normally furnishes the more complete and accurate interpretation.

While, therefore, it is undoubtedly true, as Allport, Moss and his associates, Lersch, Nony, and others have suggested, that a certain degree of 'social intelligence' is gained as we mature, in the recognition of and reaction to facial expression of emotion, with the exception of some of the more basic patterns no great degree of innateness of ability can be presumed. In fact, Allport raises the hypothesis that the ability is of a learned nature in which the criteria of judgment may have become automatic and unconscious and where there may have been originally nothing more than an innate sensitivity toward recognition of facial expression.[1] Here McDougall's theory of 'sympathetic induction' of emotions stands opposed to Murphy and Murphy, who also argue against the inheritance of this tendency to recognize definite patterns of facial expression.[2] The whole question resolves itself into the usual difficulties that attend the issue of inherited *vs.* learned responses, only now we are faced with the issue on both sides of the investigation. As Jenness points out, all studies which show improvement with training, or, as in one of his series, with an interval of no training, reflect on the original adequacy of the test. The artificial nature of the 'posed' portrait, unless, indeed, extreme precautions are taken to avoid this error, leads often to that kind of expression which has little of the primitive pattern left in it. In posing, the original nature of the pattern is frequently somewhat obscured by modifications arising from learned responses and the general cultural level of the actor. On the side of the observer again education and training, with their accompanying analytical attitudes, have also had their disturbing and rationalizing effect. This assumption is borne out by Guilford's experiment, which showed that observers who viewed the pictures briefly and unanalytically did better than those who took time to make a more analytical judgment. It is the writer's belief based upon his

[1] F. H. Allport, *Social Psychology*, pp. 226–230, 1924; T. Hunt, The measurement of social intelligence, *J. Appl. Psychol.*, 12, 1928, pp. 317–334; F. A. Moss, *Applications of Psychology*, Chap. XII, 1929; F. A. Moss, T. Hunt, K. T. Omwake, and M. M. Ronning, *Social Intelligence Test*, 1927; P. Lersch, Die Bedeutung der mimischen Ausdruckserscheinungen für die Beurteilung der Persönlichkeit, *Indus Psychotech.*, 5, 1928, pp. 178–183; C. Nony, The biological and social significance of the expression of the emotions, *Brit. J. Psychol. (Gen. Sec.)*, 13, 1922, pp. 76–91.

[2] W. McDougall, *Social Psychology*, pp. 93–99, 1921; G. Murphy and L. B. Murphy, *Experimental Social Psychology*, pp. 68–82, 1931.

own research that much fewer equivocal results could be obtained with the more primitive and basic expressions expertly posed and well done and with the instruction leveled at the affective reaction of the observer instead of at his cognitive and critical attitude. In that way we could get nearer to McDougall's 'sympathetic induction,' as illustrated by the lower animals, by young children, and by adults in moments of great and sudden commotion.

Somewhat akin to the problem just discussed are the results obtained in regard to the relative identifiability of the various emotions expressed by the face. Allport, Gates, Jenness, and Langfeld found that 'laughter' was the most easily and the most uniformly recognized, while 'anger' is usually, though not so uniformly, at the foot of the list. In general, when all lists are compared, the biologically older and less subtle emotions are more easily interpreted by the observers. There are, however, notable exceptions, like laughter at the head of the list, which is not biologically old at all, and anger at or near the foot of the list, which is one of the more primitive responses. Again the answer comes that civilized man, though much inhibited, can still express laughter unmistakably, while the same civilized face, with its diminutive canine teeth, finds it difficult to express real ferocious anger. In short, what we again need is a much more carefully worked out series of facial photographs when the right sort of talented actor or actress shall fall into the hands of the interested and trained psychologist.

As for the parts of the face which are the most significant, we should agree with Arnheim, who has brought out the significance of the total situation or *Gestalt*.[1] But Arnheim definitely proved, among other facts concerning the relation of literary citations and of handwriting to facial expression, that not a single portion of the face was as adequate as the whole, especially when the latter was placed in its original context. But when taken alone from the abstracted point of view, not the 'dancing' or 'wistful' eyes, but the mouth and region about the mouth were declared by Dunlap, Ruckmick, and Wundt to be the more significant features for emotional expression. Buzby's results were in favor of the eyes, however, and Frois-Wittmann, like Arnheim, showed that the influence of one part of the face is merely relative to the remaining features. This is another way of stating a conclusion that has perhaps been most definitely stated by Fernberger and Landis, but also appears in the observations of the Ruckmick study, that the total situation surrounding the individual whose face only is shown, to say nothing of the gestures, bodily posture, gait, vocal and other

[1] R. Arnheim, Experimentell-psychologische Untersuchungen zum Ausdrucksproblem, *Psychol. Forsch.*, 11, 1928, pp. 2–132.

bodily expressions, whether it be perceived or imagined, is after all the necessary frame for the portrait. Goodenough and Tinker found in this connection that verbal statements concerning a set of four Feleky pictures greatly aided their identification. Only in cases where the facial expression was the dominant feature was the verbal statement a subordinate factor.[1] The best 'artificial' example of the total situation is to be found on the legitimate stage or in the modern motion picture. Here things are not static but dynamic and progressive. Dunlap is right in urging the motion picture as the next vehicle of emotional expression in the laboratory. The writer has already reported one study of this nature and plans are already under way to make further studies with this medium.[2]

8. Summary.—While in the last section we have summarized and commented upon the experimental studies of facial expression, it may still be of service to pull together the various points of issue throughout the chapter. We found at first a firm belief in the legibility of the face. Socially we are inclined to make both cognitive and affective judgments concerning the face of another person by way of generalized meanings. We also identify individuals by means of the face. Furthermore we generally believe in certain type faces which symbolize certain abstract traits of character. Finally we study the face for artistic effects, perpetuating for all time certain intrinsic essential attributes of personality.

Next we studied some historical attempts to investigate and to apply the facts of facial conformations. Physiognomy was discussed as an ancient movement, presumably dating to Aristotle and even to earlier writers. Gradually it emerged as a serious anatomical and physiological study, resulting in Piderit's 'geometry' of the face on the one hand and Duchenne's artificial stimulation of muscular mechanisms on the other. At this juncture it was combined with the genetic studies of Darwin and others, which pointed the way to newer evolutionary concepts.

In the meantime phrenology had opened a way to establishing some of the more basic studies of underlying neurological structures and the quest was on to discover neural mechanisms for many of the higher mental traits. The doctrines of sensationalism and of faculty psychology offered ready concepts and possibilities. The old phrenology had to give way to the newer theories of brain localization, which are

[1] F. L. Goodenough and M. A. Tinker, The relative potency of facial expression and verbal description of stimulus in the judgment of emotion, *J. Comp. Psychol.*, 12, 1931, pp. 365–370.

[2] W. Dysinger and C A Ruckmick, *The Emotional Responses of Children to the Motion-picture Situation*, 1933.

current today, but credit must be given for laying the foundation of a psychophysics of mental operation.

After the genetic point of view became definitely accepted, several sets of fundamental principles, some of them reiterating one another, were proposed by Darwin, Wundt, and James. In several ways they tried to account biologically and historically for the movements that were made by way of expression on the assumption that the primary cause was to be found in some useful adjustment to environmental stimulation. Craig has quite rightly questioned the principle of utility since it is obviously teleological. From the psychological angle conveyance of socialized meanings from one individual to another would be as useful under some circumstances as would the more primitive responses of lower organisms to their environment. We must not overlook the fact, however, that under most conditions of civilization a certain degree of inhibition has been developed, so that the best adjustment to the situation of a funeral, let us say, is restricted outward expression. Someone has remarked in another connection that civilized man no longer laughs; he only smiles! Then, too, returning to these fundamental principles, we find that the dynamic nature of mental processes in terms of motor and other bodily effects was coming to the fore. This aspect of the method of expression will be stressed particularly in the next chapter. The modifiability of some of these responses under social control was also beginning to appear.

We next discussed the demonstrational models of facial expression which have been developed: (1) the Boring-Titchener model of the Piderit face, giving opportunity to show to large classes by means of interchangeable parts of the profile some of the more important facial expressions, (2) the Guilford model of the front face, working on the same principle, and (3) the White-Landis adjustable model for showing variations in the silhouetted facial profile. This led to a more minute study of the principal facial muscles and their function in actual expressions.

Finally we presented a series of typical studies made by means of these models and sets of photographic reproductions of posed expressions. The factors of suggestion and training have been discussed and the parts of the face that appear to be most significant in the recognition of these expressions. The net result seemed to be that while there was little evidence for innate ability to recognize faces, the primitive patterns might call forth a responsiveness in the matter of interpretation that was unlearned. What is needed is a set of well-posed and directed photographs which shall distinguish the more primitive and basic forms from the subtler and more evolved patterns.

Incidentally there is practically no experimental evidence for the interpretation of intelligence from facial expression.

Review Questions

1. What is the evidence against the analysis of traits of character and intelligence from facial appearances?

2. What service did physiognomy perform in the development of a scientific study of facial expression?

3. On grounds of contemporaneous mental and physiological knowledge, justify the claims and aims of phrenology.

4. Briefly outline three important groups of muscles that are involved in facial expression.

5. Organize the three sets of principles advanced by Darwin, Wundt, and James into one list and note the common elements in some of them.

6. What part do (*a*) a familiar vocabulary, (*b*) training, and (*c*) suggestion play in the recognition of facial expression?

7. Name the emotional expressions which are on the whole (*a*) most inadequately recognized, (*b*) most generally recognized.

8. Discuss the present adequacy of the 'test' of facial recognition in connection with Allport's hypothesis.

9. Cite the evidence for and against the belief that the eyes furnish the best cues for the conveyance of emotional meaning.

10. On the basis of the materials at hand, devise a serviceable procedure for a more thorough analysis of facial expression and its recognition.

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CHAPTER X

OTHER EXPERIMENTAL PROCEDURES OF EXPRESSION

When the body goes onto what we have called a war footing, the physiological changes that suddenly occur are all adapted to the putting forth of supreme muscular and nervous efforts.

W. B. Cannon, *Bodily Changes in Pain, Hunger, Fear and Rage.*

Here, then, is a striking phenomenon. Organisms, composed of material which is characterized by the utmost inconstancy and unsteadiness, have somehow learned the methods of maintaining constancy and keeping steady in the presence of conditions which might reasonably be expected to prove profoundly disturbing.

W. B. Cannon, *The Wisdom of the Body.*

1. The General Expressivity of the Body.—We have just now discussed only one phase—one of the most evident phases—of bodily expression. Such an emphasis on the face as an indicator of emotion must not hide the fact that in a sense the entire body is an instrument of expression. Nor should the word 'expression' any longer mislead us. We have critically reviewed the teleological meaning hidden in the term. The body, considered as a sensitive apparatus, merely responds to complex situations as well as to more minutely conceived stimuli. With that preliminary agreement we may still safely use the classical word 'expression' as it now finds a place in our standard scientific vocabulary. The *procedure of expression* is then taken to signify nothing more than the technical recording of bodily changes made in response to affectively experienced objects and situations. Of course these reactions might be abstractly considered in a chain of purely physical, or physicochemical, events, leaving the conscious aspect outside the pale of discussion. Such attempts have, however, proved quite barren of enlightened understanding and even such books as those quoted above, written mainly from the physiological point of view, give the conscious components a prominent place in the presentation of the facts. On this point we have made our own position purposely clear, for we are still pursuing the double aspective principle laid down in an earlier chapter. From the mental angle, then, we remark the widespread response which the body shows in connection with a variety of affectively colored experiences.

The quotations introduced at the beginning of the chapter announce the primary facts with which we are to deal. In appearance these statements are of a contrasty hue; in reality their colors are complementary. Both sets of conditions are germane to the topic of the affective life in its genetic aspect. For we must not forget that, basically, affection guides the organism as signals of comfort and discomfort are displayed. Taken by and large these signals are the green and red lights of biologic traffic. At this level upsets and upheavals are not ordinarily encountered to any marked degree. From these simple indicators the affective life passes on to the more sudden and sometimes violent emotions which often bring the organism, to use Cannon's phrase, to a 'war footing.' We have thus either the possibility of affective processes functioning as stabilizing agencies, which by almost imperceptible degrees keep the organism on its course; or the chance that, as violent emotions or passions, they operate to throw the organism at least momentarily off the track. Some psychologists, like Howard and Kantor, actually stress the maladjustment of emotions to the environmental situation, or others, like Bentley, refer them to objects or events that furnish a 'predicament' to the psychosome. From the phylogenetic angle many shades of function are present, depending on the complexity of the affective process. All that we are here concerned with is the observation that the body as a whole affords a ready resonator to a great variety of affective stimuli. Like the body of the violin, only much more so, it responds to a great range of affective tone, of which the two introductory passages depict somewhat extreme pitches. In all its great variety of changes we shall therefore proceed to study that body than which no more widely responsive mechanism has been or is likely to be devised.

2. The Procedure of Expression.—In previous sections of the book we have repeatedly commented on the fact that the direct observation of affective experiences is usually attended by inherent but not insuperable difficulties. The vagueness and subjectivity of the simpler forms, making the method of analysis difficult, are matched by the overwhelming seizure and commotion of the more complex forms, which so consume the whole field of attentive experience that an objective scrutiny becomes equally difficult. As Aveling rightly and significantly emphasizes, the emotions and in fact most of the feelings possess two absolutely different natures.[1] Feeling is sometimes regarded as a passive or 'affected' state, and quite as often as a dynamic, energetic expressive condition. Even the name of one of the most violent types,

[1] F. Aveling, Emotion, Conation, and Will, in *Feelings and Emotions: the Wittenberg Symposium* (ed. by Murchison), 1928, p. 51.

the passion, comes from a meek and mild Latin form meaning to suffer, to permit, to submit. An affection or affect (the German equivalent, *Affekt*, for the emotion) has the same general significance. All these are peculiarly subjective. On the other hand, the term, emotion, although perhaps not yet technically so well standardized even in our psychological literature as it should be, denotes movement, usually of a more or less vigorous sort.

It is clear that originally the term and its corresponding conception had a strong physical, sometimes even a geographical and meteorological implication. Indeed, the first appearance of the term indicated a migration of peoples. In 1579 Fenton so used the term: "There were . . . great stirres and emocions in Lombardye." In 1773 we read of an "emotion of the center of gravity," and in 1755 of an "emotion of thunder in the air." Addison in his *Tatler* (1709), described a political agitation under the title, "Accounts of Publick Emotions, Occasion'd by the Want of Corn." Sometimes this notion of agitation and commotion is transferred to the human and animal body, and we are not sure whether the experience of emotion or the bodily movements or both are referred to. For instance, in John Locke (1693) we read:

"I think nothing need to be said to encourage it [bathing in cold water] provided that this one caution be used, that he never go into the water when exercise has at all warm'd him or left any emotion in his blood or pulse."

Many of us recall a similar situation in Hawthorne's *The House of the Seven Gables* (1851), where he writes, "Mellow melancholy, yet not mournful, the tones seem to gush up out of the deep well of Hepzibah's heart, all steeped in its profoundest emotion." In French the term is the equivalent of the English; in German while the more technical term is *Affekt*, one of the more general terms is *Gemütsbewegung*, which means a movement referred to the life of feeling and will. In fine, it becomes clear that the background of emotion is distinctly one of movement or commotion and that there has always been a strong bodily implication. Even the Greeks, as we noted above, were prone to locate the emotional life, if not indeed the whole mental life, in some physiological organ of the body.[1]

We must not infer from this discussion that it is impossible to observe affective experiences directly and analytically, but we do recognize an inherent difficulty in the simpler as well as in the more

[1] Dr. A. Sophie Rogers, in an unpublished dissertation for the Master's degree, made a complete study of the places where the mind was located in many writers among the early Greeks and Romans. The organs affected by emotion in one form or another included: body in general, brain, breast, diaphragm, gall bladder, heart, intestines, jaws, kidneys, limbs, liver, lungs, medulla, spleen, stomach, throat, viscera.

complex forms. We are 'affected' or 'moved,' or both. With training, however, direct observations, as we shall later see, are possible. We are, to be sure, in a difficult sector of the mental life. Naturally in the early researches, easier procedures[1] were devised to circumvent the resisting object. Two principles were seized upon as aids in the scientific attack: (1) the fact that feelings, perhaps more than any other mental process, were accompanied by widespread bodily changes laid the foundation for the *procedure of expression*, and (2) the peculiar tendency of affective processes to attach themselves to sensory and ideational experiences provided the basis for the second indirect approach, namely, the *procedure of impression*. The latter procedure we shall discuss in detail later.

The first coordinate procedure of investigation which therefore circumvents our primary difficulty depends upon the afore-mentioned fact, that the affective life strongly stirs up bodily reactions of all sorts. This approach through the recording of bodily reactions is widely known, then, as the procedure of expression. While we still use the earlier types of records of physiological processes together with such improvements in apparatus as have been continuously made, whenever newer physiological techniques have become available, psychologists have avidly seized them in order to use a tool, perfected in the physiological and biological sciences, as a handmaid in the service of psychology. The underlying hypotheses for all these special techniques is that if we can not attack the affective life directly, we can describe and measure it in terms of widespread physiological effects. We are not primarily interested in these physiological effects as such, but we try to correlate them with the known mental experiences, which may be obtained by procedures peculiar to psychology. Up to the present time the following types of physiological approach have been in use or have been suggested for use in analysis of the affective life: expansion and contraction of protoplasmic tissues, involuntary movement of pursuit toward pleasant situations and avoidance of unpleasant situations; extension and retraction of voluntary muscles; fluctuations in the rate and volume of respiration, changes in the rate and volume of circulation, alterations in blood pressure; reverberations in the visceral

[1] The author is here following his proposed terminology. Historically the procedures to be described fall under the caption, the *method of expression*, as the procedures later to be treated fall under the caption, the *method of impression*. Since in his methodological classification the term 'method' is reserved for the general mode of investigation that applies to the science as a whole or to a major part of it, the term 'procedure' will be consistently used to designate the more specialized approaches. *V.* C. A. Ruckmick, A schema of method, *Psychol. Rev.*, 21, 1914, pp. 393–401.

region; volumetric changes in various parts of the body through distension of the capillaries with blood; tumescence and detumescence of the sex organs; secretions of the endocrine organs, and presence of their products and of hormones in the blood; changes in bodily electrical resistance and in the output of somatic electrical energy; appearance and disappearance of the Nissl substance in the brain cells; alterations in the rôle of basic metabolism. This is a full but probably not a complete list. Not all the techniques have been sufficiently standardized or proved reliable for experimental results; some of them require the human observer to submit to heroic and unusual measures and are therefore not immediately applicable to the laboratory.

Although, as we have seen, the theoretical approach to the feelings through bodily expression, especially in the face, had a long history, it is certain that scientifically we had to wait until the latter half of the last century to see a laboratory procedure developed. Not only had the way been paved through the study of and interest in the face, but as our discussion of the anticipations of the James-Lange-Sergi theory showed us, the psychophysical interpretation of the emotions was gaining ground. While it is always hazardous to indicate some one man who was responsible for the introduction of an idea or a procedure, most authorities credit the Italian physiologist, Mosso, with the detailed and effective use of the expressive procedure. At first interested in the phenomena of sleep, he soon applied his instruments to the affective field as well. In 1880 he published his treatise *Concerning the Circulation of Blood in the Human Brain*, which summarized some important experimental results on exposed human brains, beginning with a remarkable syphilitic case in 1875. Not only did he observe by means of the naked eye the pulsation of the blood vessels in the brain but he devised recording apparatus for transferring the record to a smoked paper on a revolving drum (kymograph) which was run by clockwork. Mosso developed an instrument for recording the voluntary muscular contraction of any one set of fibers (ergograph) together with an armrest, or clamp for the forearm, and also several types of plethysmograph for the study of blood volume. These may be seen as accessory pieces of apparatus attached to a most ingenious tilt table (*v.* Fig. 23), which he devised not only for the study of sleep, but for the sake of analyzing the effect of emotions on the direction of circulation, *i.e.*, either toward the head or toward the feet.

He called it a 'scientific cradle.' As the blood flowed either to the head or to the feet the table tilted in one or the other direction. He made the "balance so sensitive that it oscillated according to the rhythm of respiration." He says, "When all is quiet, one of us would intentionally make a slight noise, by coughing, scraping his foot on the ground, or moving a chair, and at once the balance inclined again towards the head, remaining immovable for four or five minutes." This was while the person was asleep, in the normal course of which disturbances of this sort were noticeable. But during

waking periods there was also an effect noticed with the coming and going of affective processes. Mosso said, "It was proved by my balance that at the slightest emotion, the blood rushes to the head."

Various anecdotes have been narrated concerning plausibility of such measurements. Mosso himself declares that:

"A gentlemen once told me that from fright a ring had one day fallen from his finger which at other times he could only remove with difficulty. He had also noticed that his fingers actually grew smaller whenever he experienced strong emotion, thus rendering it easier to take off the ring.

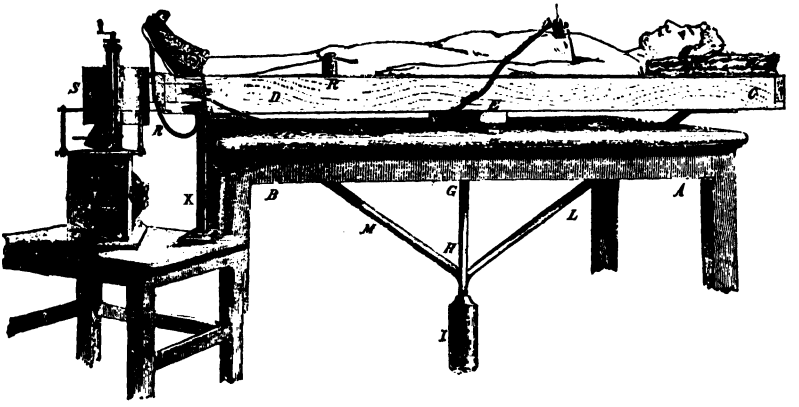


FIG. 23.—Mosso's balance for the study of the circulation of the blood in man. The balance *DC* on which the subject lies has its pivot at *E*. *R* is a weight which can be moved to adjust the equilibrium. A metal counterpoise *I*, attached to this balance through the table *AB*, is also adjustable on the rod *GH* and is reinforced by the braces *ML*. Recordings are made on the Ludwig-Baltzar kymograph of the gross movements of the balance and also of the blood volume from the feet, and of the changes in respiration in the chest. Mosso claims that the balance would oscillate with breathing but that during relaxation and sleep the flow of the blood was toward the head. This also occurred "in the slightest emotion." [*Reproduced from A. Mosso's Fear (trans. from the 5th ed. by Lough and Kiesow)*, 1896, p. 96, *courtesy of Longmans, Green & Company.*]

"The proverb, 'Cold hand, warm heart,' is the popular expression of the fact that the hands grow cold when the blood, in consequence of an emotion, retreats from the limbs to the heart."[1]

Feldman has more recently called attention to a somewhat similar incident in a very interesting historical passage found in the Babylonian Talmud, written about 500 A.D. but containing proverbs collected as early as 250 B.C., which runs as follows. The story concerns Vespasian, who is talking with Rabbi Johanan ben Zakkai.

"In the meantime there came to him a messenger from Rome and spake to him saying: 'Up, for the Caesar is dead, and the nobles of Rome have agreed together to choose thee for their Caesar.' Now he had at that time drawn on one of his shoes, and was in the act to draw on the other, yet would

[1] A. Mosso, *Fear* (trans. by Lough and Kiesow), p. 96, 1896.

not his foot pass therein; then he set himself to pull off that which he had drawn on, but it clave to his foot. Thereupon spake Johanan to him and said: 'Be not disquieted! Thou hast received good tidings, and it is written: a good report maketh the bones fat.' 'What, then,' said he, 'must I do?' And he said: 'Make to pass before thee some man that thou hatest; for it is written: a broken spirit drieth the bones.' Then he did as Johanan had counselled, and his foot passed into his shoe."[1]

This was a long time before the Wundtian formula of a strengthened and retarded pulse as a concomitant of pleasurable emotion and the reverse of these characteristics for unpleasantness. The rapid rise in the number of expressive procedures and techniques since the early days of Mosso's experiments can be traced directly to two influences. We have already indicated some of these investigations and results while discussing topics under other headings. The first was the line of development from the Darwinian theories of biological origin and significance through the studies of motor expression of emotion in the face and other voluntary and involuntary systems, passing on to the James-Lange-Sergi controversy, and culminating in the more minute investigations of Sherrington, Jackson, Head, Goltz, Bekhterev, Cannon, Crile, Bard, Lashley, and others. The other can be traced to discussions of the Wundtian tridimensional theory and suggests such names as Lehmann, Külpe, Störring, Féré, Münsterberg, Orth, Alechsieff, Ziehen, Dumas, Corwin, Young, Landis, Blatz, and many others. These studies are not easily classified into one or the other category, of course, since there is much overlapping of influence, aim, and interest, but historically the two main avenues of development have been kept fairly clear. Today the studies using the expressive procedures are so numerous that a complete enumeration, to say nothing of a detailed account of each one, is a task that can not be undertaken in a book of this compass and nature. The confines of such experimentation and the emerging discussions approach encyclopedic proportions. We shall therefore have to confine ourselves to representative samples and outline sketches.

One outstanding principle which appears, however, to be almost universally recognized and which has been mentioned in previous chapters is the fundamental psychophysiological approach. Mental analysis, or at least its near of kin, mental notation of the experience involved, even if it means no more than a report of the algedonic quality of pleasantness and unpleasantness, is essential to all laboratory investigations in the realm of feeling. As Beebe-Center correctly points out,[2] Orth's and Alechsieff's insistence on introspective descriptions, as the primary answer to the inadequacy of the work of Brahn,

[1] S. Feldman, Experimental psychology in the Talmud, *Amer. J. Psychol.*, 33, 1922, p. 304.

[2] *Op. cit.*, p. 39.

who omitted these reports in human subjects, has become the rule of the day. Where such reports are unavailable, as in the case of the lower animals and in very young children, final or semifinal interpretations can only be made with reference to human experience.[1] In the sensory field, in other words, there is a fairly close correspondence between stimulus, physiological effect, and mental experience. In the field of feeling no such correspondence has as yet appeared. The reasons have already been gone into, but the chief one, by way of reminder, is what Troland has called the retroflex nature of feeling, or what others have brought out in the discussion of the bear behind safe bars, when the percept involves cerebral factors that greatly modify, or have in time greatly modified, the sensory components corresponding to stimulation from without.

3. Principal Divisions of the Procedure of Expression.—While it is, therefore, impracticable to describe all the numerous ramifications of the procedure of expressions, some of the more important and fertile courses of research can be pointed out. Many of the techniques employed have been borrowed from physiological disciplines and adapted to the use of the psychologist. Generally speaking, however, the main lines of research follow, with few exceptions and always newer additions, the major bodily systems. For purposes of exposition they may be more clearly presented in the following order:

I. Circulatory process
  A. Blood volume
  B. Blood-pressure
  C. Rate of heart or pulse (cardiac rate)
  D. Changes in the distribution of the blood to the
    1. Brain
    2. Viscera
    3. Peripheral parts (forearm, hand, *etc.*)
    4. Cutaneous areas
  E. Changes in the constitution of the blood
II. Respiratory process
  A. Rate of breathing
  B. Volume or depth of breathing } { *A*. Thoracic
  C. Ratio of respiration (ratio of inspiration to expiration) } { *B*. Abdominal
  D. Pattern of respiration
III. Voluntary (and involuntary) striped musculature
  A. Extent of movement (of arm or finger) in flexion } voluntary
  B. Rate of movement (fatigue) in flexion }

[1] M. Brahn, Experimentelle Beiträge zur Gefühlslehre, *Philos. Stud.*, 18, 1903, p. 127; J. Orth, *Gefühl und Bewusstseinslage*, Berlin, 1903; N. Alechsieff, Die Grundformen der Gefühle, *Psychol. Stud.*, 3, 1907, p. 156.

- *C.* Flexion *vs.* extension
- *D.* Automatic movement
- *E.* Rate of tremor
- *F.* Facial expression } involuntary
- *G.* Gestures
- *H.* Gait
- *I.* Posture
- *J.* Vocal expression
- *K.* Musical instrumental expression
- *L.* Action-current technique

IV. Metabolic process
- *A.* Consumption of oxygen
- *B.* Elimination of carbon dioxide
- *C.* Release of glycogen
- *D.* Salivary analysis for p_H

V. Digestive process
- *A.* Stomach
- *B.* Duodenum
- *C.* Rectum

VI. Electrodermal response (EDR) (galvanic reflex, PGR)
- *A.* Hathaway technique (also other amplifiers) } *A.* Exosomatic technique
- *B.* Wechsler technique (D'Arsonval types) } *B.* Endosomatic technique
- *C.* Landis technique (AC galvanometer) } *B.* Endosomatic technique
- *D.* String galvanometer technique

VII. Perspiration
- *A.* Electrical recording technique

VIII. Endocrine (and other) Glands
- *A.* Suprarenal glands (adrenalin, cortin, epinephrin)
  1. Administration (injection)
  2. Extraction
  3. Secretion
- *B.* Thyroid gland (thyroxin)
  1. Administration (injection)
  2. Extraction
  3. Secretion
- *C.* Pituitary gland (tethelin, pituitrin)
  1. Extraction
  2. Secretion
- *D.* Sex glands (gonads ?, interstitial cells)

IX. Central Neural Structure
- *A.* Brain
  1. Excision
     - *a.* Decapitation (transection of neuraxis below medulla at level of first cervical segment) usually at level of posterior colliculi
     - *b.* Decerebration (removal of brain usually at level of posterior colliculi)
     - *c.* Decortication (removal of parts or all of the cortex)
  2. Pathological cases
  3. Microscopic analysis
     - *a.* Nissl substance in cerebellar cortex
- *B.* Spinal sectioning.

This outline affords a synoptic review of the major divisions and subdivisions of the expressive procedure. And yet in a sense it is misleading because many of the techniques, especially those in the last few categories, are often primarily directed toward strictly physiological or neurological investigations and have not as yet been satisfactorily adapted to the psychological study of emotion and feeling. This is to be expected since the arrangement of the outline is roughly historical and the newer techniques have not therefore been brought under the proper control for experimental adaptation to the psychological laboratory. We shall now proceed to discuss in greater detail each one of the principal techniques included in this schematic outline. Apparatus will also be described and illustrated.

4. Description of the General Recording Techniques.—We have already shown that measurements of *circulation* and *respiration* became the earliest tools of the psychologist in his attack upon the bodily



FIG. 24.—The Marey tambour.

accompaniments of feeling and emotion. For the proper recording of such physiological processes two accessory instruments are commonly used, one for transmitting impulses from the special apparatus attached to the body and the other for recording the changes for permanent reference and calculation. Since the most frequently used devices depend on transmission through columns of air, or on pneumatic conduction, the former type usually consists of a *Marey tambour*, or some adaptation of this well-known instrument. It is illustrated above (Fig. 24). Essentially it is a narrow tube with a small (5 mm.) lumen for the passage of air into a flat circular chamber or capsule at one end (35 mm. in diameter). Across the top of this chamber a thin rubber membrane is attached so that it will rise and fall with the air pressure inside. In its center a small piece of aluminum is fastened; on this rides the lever which thus transfers the fluctuations of the membrane to the paper mounted on the recording apparatus. The length of the lever or stylus is adjustable so that a satisfactory amplitude of excursion can be obtained and the weight of the stylus, which is also made of aluminum, or of reed, celluloid, or similar materials, is not too much of a load on the membrane. Air leaks should be avoided at all connections and in the mounting of the membrane. Sometimes a slight air

pressure is maintained in the air system. Many sizes and special modifications are available.

The writing point of this tambour is brought to bear on the surface of a revolving drum of a *kymograph* (κῦμα, wave, and γράφειν, to write), on the

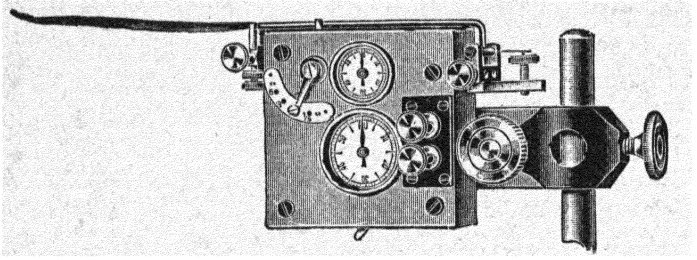


FIG. 25.—Jacquet's graphic chronometer. (*Courtesy of the C. H. Stoelting Company.*)

surface of which some form of calendered paper is mounted. Sometimes two drums, or a drum and a revolving cylinder, are set up in tandem arrangement to carry a long strip of paper for lengthy continuous records. For less lengthy records the mechanism which actuates the drum can also be set to make the drum slowly descend on its axis, thus affording a spiral record. The paper is coated with soot, or 'smoked' by means of a specially devised instrument. A time line may be recorded parallel to the other records, which may consist of a separate 'breathing curve' and a 'pulse rate curve,' or of a combination of these, since the heartbeat often shows fluctuations with breathing. The speed of rotation of the drum is made adjustable, but must be uniformly maintained at any speed because, even though a time line is added, it is often desirable to compare sections of the graphic record. The time line may be recorded directly from the pointer on a small clock of the Jacquet type (Fig. 25), from an electromagnetic marker connected with a chronoscope, or from a stylus mounted on the tine of a tuning fork. The kymograph illustrated here (Figs. 26, 27) is held at constant speed by means of a governor. When the kymograph is run by an electric motor, a synchronous type is preferred for constancy of rotation. After the record is complete the smoked

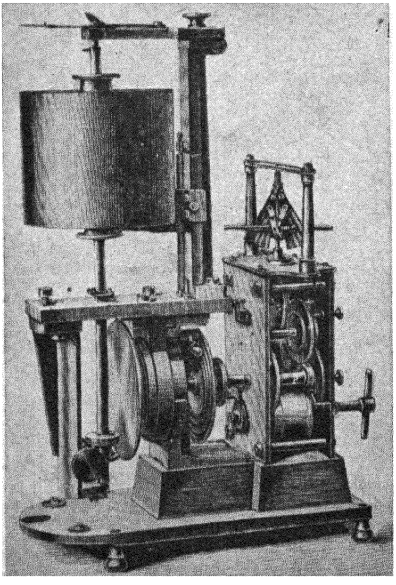


FIG. 26.—Ludwig-Baltzar kymograph. (*Courtesy of Petzold.*)

paper is 'fixed' in a bath of dilute shellac, or like compound, or by spraying.

There is a tendency today to do away with the older forms of recording in which the pneumatic system furnished the vehicle of

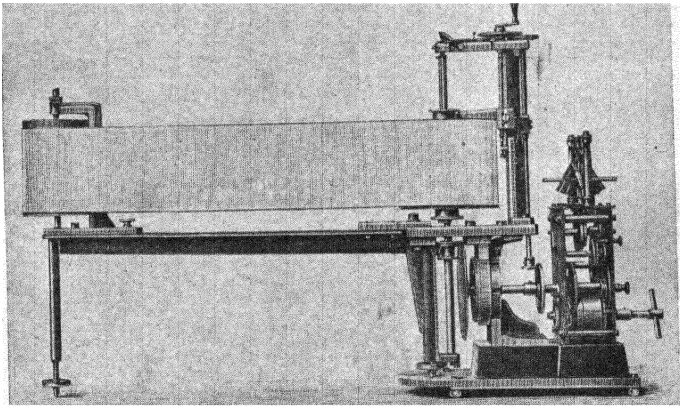


FIG. 27.—Ludwig-Baltzar kymograph with extension for long continuous recording. (*Courtesy of Petzold.*)

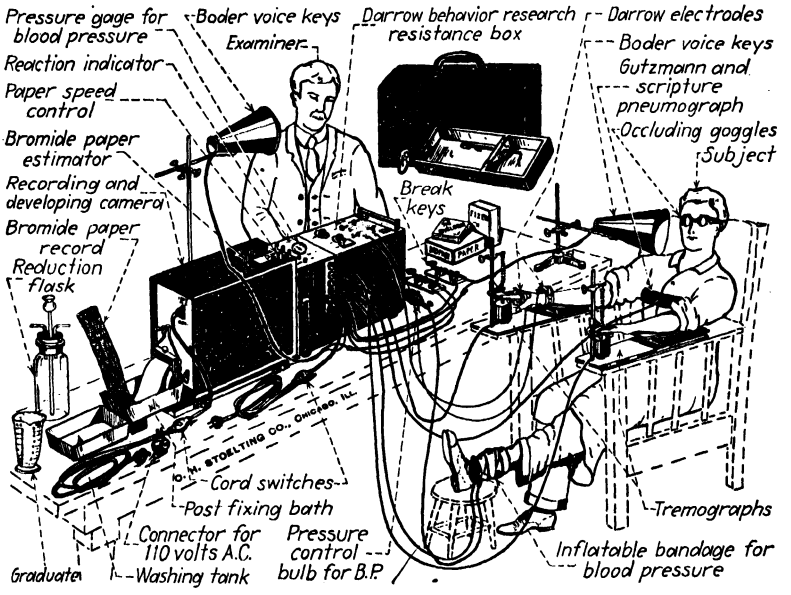


FIG. 28.—Darrow behavior research photopolygraph. (*Courtesy of the C. H. Stoelting Company.*)

transmission to the recording apparatus and in which the recording was done by the easily smudged and somewhat cumbersome 'smoked

drum' method. Many records are now being taken by devices using small pens filled with a glycerin ink or similar compound or specially modified fountain pens. The Renshaw polygraph is an example of such an improvement. The paper can be mounted in fairly large quantities on conveniently located rolls and immediately affords a permanent record. Other polygraphs, like the Jacquet, use a battery of tambours. There is also an increasing demand for apparatus which provides a photographic means of recording on either sensitive films or papers. In one of the newer forms of such apparatus, the Darrow photopolygraph, the record can be watched in the process of making

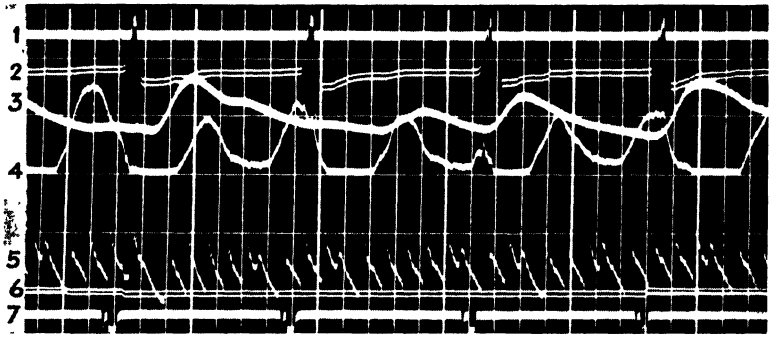


FIG. 29.—Darrow photopolygraph record. 1, Verbal reaction time-record; 2, right (active) hand tremograph-record; 3, electrodermal response; 4, pneumograph-record; 5, blood pressure-record; 6, left (passive) hand tremograph-record; 7, verbal stimulus time-record. (*Courtesy of Dr. Darrow and the C. H. Stoelting Company.*)

and the chemical development of the film or paper takes place almost completely in the apparatus itself.

Since this is one of the most highly developed pieces of recording apparatus now available, a detailed description may be in order. The graphic record (Fig. 29) clearly shows the responses indicated in the legend, with two additional features: (1) the time interval is marked off by the vertical lines which in this case are spaced 2 mm. apart per second, with heavier lines 1 cm. apart, the speed of the instrument being capable of adjustment, however, to read 4 mm. per second; (2) the horizontal lines provide bases for the quantitative measurement in terms of ohms in connection with the electrodermal responses (*4*) and the reactions to stimuli (*1*, *2*, *6*). The relative variations in the amplitude of the plethysmographic blood pressure and the pneumographic record can also be measured in terms of these horizontal lines. The verbal reaction time (*1*), the active hand tremograph record, which is usually the right hand in right-handed people, and the passive (left hand) tremograph records are indicators of emotional stress due to blocking and conflict. The pneumographic record (*5*) is used both as an indicator of deep

respiration following stress and in the calculation of the inspiration-expiration ratio. The blood-pressure record (*3*) is used to indicate either pathological conditions or extreme irritability with a possible paranoid tendency.[1]

Most of the photographic types demand electrical transmission of effects from the body. Where there is no output of electrical energy or a variation of outside electrical energy through resistance in a part of the body, mechanical or acoustic energy is translated through carbon buttons or sensitive diaphragms into electrical energy, which is then amplified and recorded by means of light-levers reflected from mirrors which are attached to sensitive milli-

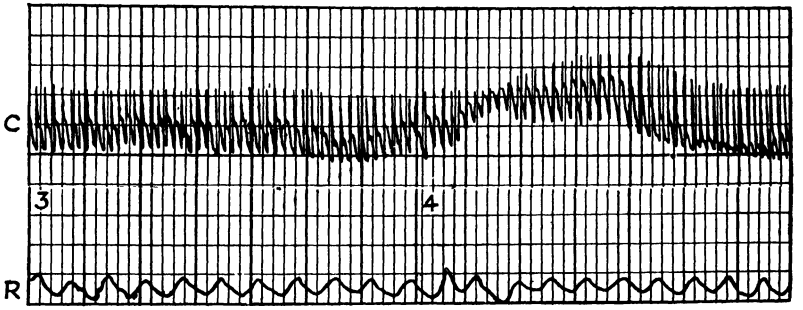


FIG. 30.—A portion of a record made by the Larson cardio-pneumo-psychograph. The upper graph (*C*) gives the pulse beat and the rise and fall of blood pressure. The lower curve (*R*) shows respiration. The record was taken from a bandit who was arrested in the Middle West for shooting at officers or attendants while resisting arrest. He was suspected of having killed a state trooper in Pennsylvania. In a previous portion of this record, not shown here, he was asked two questions, "Have you been in this room over two minutes?" (Yes) and "Have you had anything to eat since you have been in this room?" (No). At the beginning of this record, marked 3, he was asked "Have you had a cigarette since you have been in this room?" (No), and at 4 "Did you kill the state patrolman at the Melrose Service Station?" (No) He later confessed to the murder, but after securing a lawyer repudiated his confession, was tried and acquitted. The marked rise in the blood-pressure and an irregularity in breathing are to be noted at 4 which, in terms of his confession, was a lie. (*Courtesy of Dr. Larson.*)

ammeters or galvanometers. A cardiac record taken in this manner is shown in Fig. 30. The tendency is to record as many significant expressive responses of the organism as is possible, but more especially a combination of continuous changes in circulation and respiration as in the Larson cardio-pneumo-psychograph.[2] This instrument has been frequently used in detection of lying, but its reliability apparently depends chiefly upon the interpretation of someone who has had considerable ability in perceiving certain changes in the patterns recorded and in utilizing his authoritative presence to force a confession of guilt from the suspected individual. An extensive program of research with this technique and other procedures is under way but Larson has repeatedly emphasized the fact "that this

[1] A. R. Luriia, *The Nature of Human Conflicts*, 1932; C. W. Darrow, The behavior research photopolygraph, *J. Gen. Psychol.*, 7, 1932, pp. 215–219.

[2] J. A. Larson, The cardio-pneumo-psychogram, *J. Exper. Psychol.*, 6, 1923, pp. 420–454; *Lying and Its Detection*, 1932.

method has not been sufficiently tested from all angles to be relied upon unquestionably."[1] In a later model of this apparatus the electrodermal response was added to the record.

5. Measurement of the Circulatory Processes.—Continuing our discussion of different forms of apparatus indicated in the above outline, we shall describe instruments and techniques which record various forms of expression in which the processes of circulation are involved. Starting, then, with the measurement of blood volume, the plethysmograph (πληθύς, volume) is the most common form of instrument used to record changes in various parts of the body which are due to fluctuations in the flow of blood to that part. In reality it responds to the increased size of the part itself. Specifically it is an outgrowth of Mosso's body 'cradle,' which has been more recently used by Weber[2] in the case of hypnotized subjects, although, as the diagram indicates, Mosso also used instruments attached to the foot and to the chest. The plethysmograph accordingly takes a variety of forms, depending upon the part of the body to be tested. One form, for example, is the Francke model for the hand (Fig. 31). It consists of a large glass jar filled with water. Over the top of the jar a special rubber sleeve and metal cap are clamped. These fit snugly about the wrist while the hand is immersed in the water and the fingers clasp a large wooden spool inside. Enough water is placed in the jar so that it rises halfway in a bulb which forms an enlarged portion of a glass tube attached to one side of the metal cap. At this point the fluctuations in the water level, caused by changes in the volume of the hand, are translated to changes in air pressure which actuate a tambour. Another type is the Lombard-Pillsbury finger plethysmograph with piston recorder.[3] The

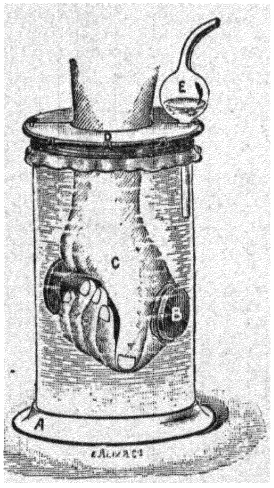


FIG. 31.—Francke's hand and wrist plethysmograph. *A* is a heavy glass jar containing water filled up to the level of the expanded glass tube at *E*. Changes in the water level are then transferred to a pneumatic system for recording. A rubber membrane *D* covers the top of the jar and is made tight about arm. The hand clasps a wooden grip *B* in the water. (*Courtesy of the C. H. Stoelting Company.*)

[1] *Ibid.*, p. 412.

[2] E. Weber, *Der Einfluss psychischer Vorgänge auf den Körper*, 1910.

[3] W. P. Lombard and W. B. Pillsbury, A new form of piston recorder and some of the changes of the volume of the finger which it records, *Amer. J. Physiol.*, 3, 1899–1900, pp. 186–200.

arm is placed on a suspended armrest and the finger is inserted in a double-walled chamber mounted thereon. A stream of water at constant temperature flows between the walls of the chamber. A rubber tube passes from the chamber to a cylindrical glass recorder, 4 mm. in diameter. Inside this cylinder a plaster of Paris piston 1.25 mm. thick transfers the changes in air pressure to a light metal marker. Models are also available for the arm and other parts of the body, as seen in Mosso's device (Fig. 32).

Blood pressure is measured by means of a sphygmometer (*σφυγμός*, pulse) or, when a mercury or other type of pressure gauge is included,

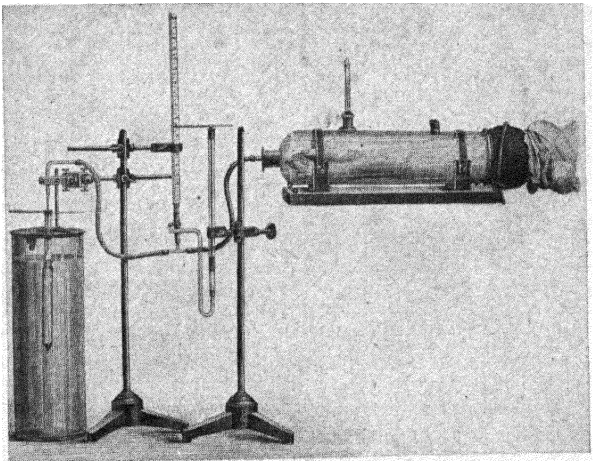


FIG. 32.—Mosso's plethysmograph. (*Courtesy of Petzold.*)

by means of a sphygmomanometer. Frequently a stethoscope is also required (auscultatory method) to detect the precise point on the scale at which the pulse in the forearm has disappeared.

Briefly, most forms include a cuff or rubber sac contained in a bandage that is wound tightly around the upper arm. A rubber tube proceeds from this cuff through a Y to a manometer or mercury column in one end of a U tube. Air is pumped by means of a rubber bulb or foot bellows into both cuff and manometer well above the point where oscillations in the mercury column or on the dial gauge are still discernible. Pressure is then slowly released until regular fluctuations definitely reappear. At this point the reading is taken as the systolic blood-pressure (maximum). The lower point, where these periodic fluctuations disappear, is the reading for diastolic or pulse pressure. A small auxiliary bellows attached to the system can be made to transcribe these pulse beats to a kymograph or other recording apparatus and long continuous records may be run if an initial uniform pressure of about 90 mm. of mercury is maintained. In that case, as Larson

admits, neither systolic nor diastolic blood-pressure is specifically recorded, only variations in the volume from time to time. Sometimes a more convenient form of dial gauge is used, in which an aneroid flat circular capsule takes the place of the mercury column (Fig. 33.)[1]

The sphygmograph is an allied form, as the name would indicate, except that it is more definitely and generally employed to register the number of pulsations per minute. Obviously a time line has to be entered on the record for purposes of computation. One of the classical forms is Francke's model, which uses not air conduction but mechanical transmission through a series of levers as a means of conveying the pulse of the wrist to the surface of the kymograph (Fig. 34). In a similar manner the pulse may be picked up from the end of the finger or through an air-tube system from a number of other parts of the body. More recently electrocardiograms have been extensively used as indicated above. With the help of an assistant the author has developed a simple carbon button which can be attached to the wrist, forearm, or other convenient part of the body.[2] Through an electrical amplifying system and the deflection of a small mirror on which a beam of light is made to impinge, the record may be photographed. In cardiograms of this sort, not only the pulse rate, but the intensity of the beat and the secondary rhythms of the heart, some of which are due to respiration, are available (Fig. 35). The interrelations of these processes are such that plethysmographs and sphygmographs can sometimes be used interchangeably. In fact one of Mosso's early plethysmographs was called a hydrosphygmograph because, as we noted above, either the arm or the leg was immersed in water.

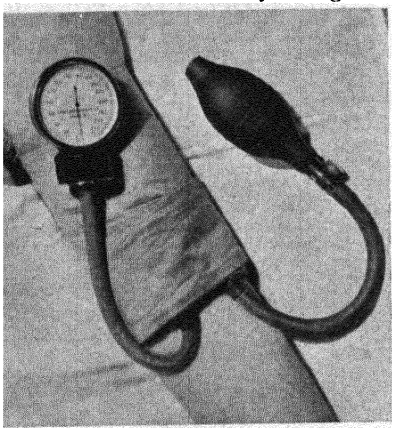


FIG. 33.—The Tycos aneroid sphygmomanometer attached to arm of subject. (*Courtesy of the Taylor Instrument Companies.*)

Through the proper use of these instruments in suitable combinations at different locations on the body, the preponderant flow of the

[1] For a competent and detailed account of the more reliable methods of registering pressure pulses, especially by optical manometers, consult C. J. Wiggers, *The Pressure Pulses in the Cardiovascular System*, 1928. The various pulses in the different portions of the circulatory system, the sequence of events, and the character of the several responses are described and illustrated. A bibliography of over three hundred titles is appended.

[2] W. H. Grubbs and C. A. Ruckmick, An electrical pneumograph, *Amer. J. Psychol.*, 44, 1932, pp. 180–181; W. S. Dysinger and C. A. Ruckmick, *The Emotional Responses of Children to the Motion Picture Situation*, pp. 13–15, 1933.

blood to one or another part of the body may be registered. With such records a more detailed study is afforded than was possible with Mosso's 'scientific cradle.' In the case of the brain special difficulties

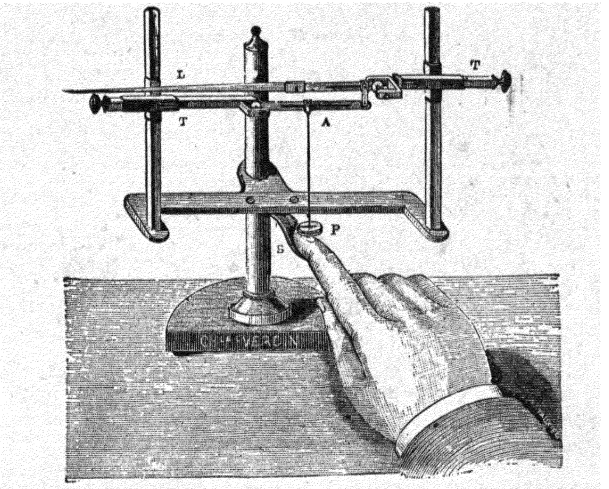


FIG. 34.—Francke's volumetric sphygmograph. (*Courtesy of the C. H. Stoelting Company.*)

are met because of the bony structure of the skull. But fortunately even in Mosso's day clinical cases presented themselves and, by having a portion of the brain laid bare through removal of a section of the

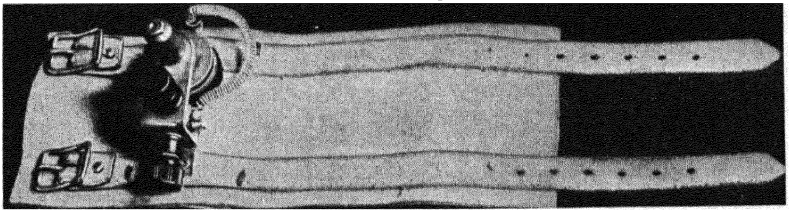


FIG. 35.—Grubbs-Ruckmick pneumo-cardiograph. [*From W. S. Dysinger and C. A. Ruckmick, The Emotional Responses of Children to the Motion-picture Situation*, 1933, p. 14, (*Courtesy of The Macmillan Company*).]

skull, afforded an opportunity to "see how the brain writes when it guides the pen itself."[1] Mosso found that "the circulation in the brain is accelerated during mental activity, emotion, and in a waking condition."[2] Later Shepard studied a similar case and compared volumetric changes in the brain and the hand with more equivocal

[1] *Op. cit.*, p. 77.
[2] *Ibid.*, p. 82.

results that will be discussed in a later section.[1] A very simple device for quickly ascertaining the amount of blood circulation that is present in any portion of the peripheral areas consists of a small disk of glass 1 cm. in diameter mounted on a spring pressure gauge. While one presses down on the cylindrical gauge until the skin under the glass comes to a definite degree of paleness, one may easily read off on the side of the cylinder the amount of pressure in grams, because a circular band is held in place at the maximum reading. For ease in reading, a standard set of three semicircular paper disks, which fit over one half of the glass disk, furnish standards of reference for different degrees of paling.

Some of the simpler forms of sphymographs or cardiographs using an air system involve nothing more than a specially modified Marey capsule with a knob pressing on the pulse and an inflated membrane bound with a curved metal strap which is fastened around the appropriate part of the body. Fluctuations transmitted through the knob alter the pressure of the inflated membrane against the curved metal strap. These alterations are then transferred to the recording Marey tambour.

Changes in the constitution of the blood may be made by taking samples, formerly 5 cc. but more recently 1 cc. or less, and subjecting them to chemical analyses. Outside of tests for some of the endocrine products, and of the electrochemical tests for hydrogen ion concentration (p_H), these techniques are not frequently used in researches on feeling and emotion. The presence of blood sugar (glycogen), a by-product of the adrenals, the count of red and white corpuscles, and the ratio of ions of free acid hydrogen to free ions of an alkaline hydroxide (p_H) may serve as indicators of emotional excitement. The symbol p_H, sometimes written pH, has been credited to Sorensen as equivalent to $-\log C$, in which C represents the concentration of the hydrogen ion expressed as a power of 10. Actually the formula gives the value of the electromotive force (E) between a hydrogen electrode in a normal solution (in respect to the hydrogen ion) of an acid and a hydrogen electrode in any other concentration of the hydrogen ion. The formula reads[2]

$$E = .058 \log \frac{1}{C}.$$

The normal blood is slightly alkaline (7.2) as compared with the potential of a neutral solution (7.0). During emotional excitement

[1] J. F. Shepard, Organic changes and feeling, *Amer. J. Psychol.*, 17, 1906, pp. 522–584; *The Circulation of Sleep*, 1914.

[2] S. Popoff, *Quantitative Analysis*, 2d ed., pp. 320–321, 1927.

it has been reported to have reached 7.7. More specific results will be enumerated later.

6. Measurement of the Respiratory Processes.—The techniques which record changes in respiration have been developed simultaneously with most of the procedures described above. The problem here is not

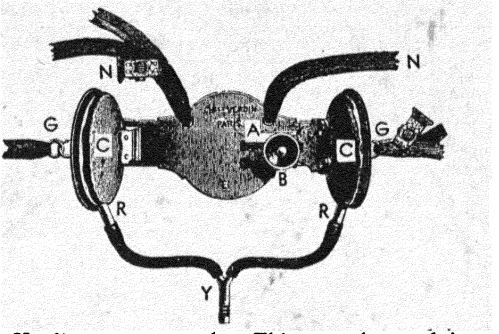


FIG. 36.—The Verdin pneumograph. This may be used in connection with thoracic or abdominal breathing. *NN* is an adjustable tape which serves as a neck-band. *GG* is an adjustable girdle which may be placed about the chest or waist. *CC* are metal capsules covered with rubber membranes that are pulled by the girdle *GG*. The air thus exhausted is communicated to the pneumatic system through nipples at *RR* and the rubber tubing joined at *Y*. *A* is a slide which is clamped at *B* for fine adjustments. (*Courtesy of the C. H. Stoelting Company.*)

quite so complicated since many of the instruments can be used for a number of different purposes. In fact, refinements have taken place largely with respect to forms of the pneumograph (πνεῦμα, wind or air). The most common types are the Verdin pneumograph (Fig. 36), used

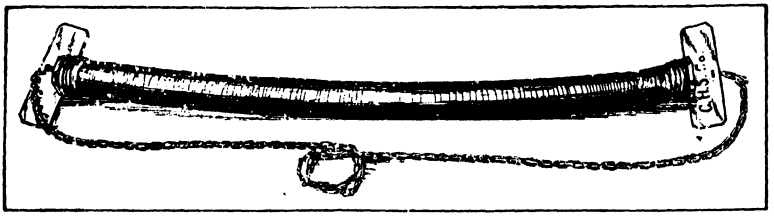


FIG. 37.—Sumner's pneumograph. This consists of a special spring covered with elastic rubber tube attached to end plate in such a way as to make the interior air-tight. A nipple at one end allows the change in air-pressure within the tube to be transferred to a pneumatic system. The chain may be fastened around the chest or waist for either type of breathing. (*Courtesy of the C. H. Stoelting Company.*)

principally with chest breathing, and the Sumner pneumograph, usually employed for abdominal breathing. Often both types are used to obtain a complete record. The former consists of a double capsule mounted on a short breastplate with an adjustable tape encircling the chest and attached to hooks which are mounted on the two membranes. As the chest expands the membranes are pulled outward,

thus causing suction in the air line and depressing the membrane of the Marey tambour at the recording end. In the Sumner form a rubber tube about 40 cm. long and 2 cm. in diameter contains a coiled spring, much like those used in shade rollers (Fig. 37). One end of this tube is tightly sealed and the other is connected to a nipple from which a rubber tube of smaller diameter leads to the recording tambour. Both ends have metal plates to which an adjustable tape is attached. This is passed around the body. As the abdomen, for example, expands in breathing, the large rubber tubing is stretched against the pull of the inside spring and the air chamber within is partially exhausted of air, causing the recording tambour to become depressed.

Here we must recall that some of the electrical techniques which primarily give records of the circulatory processes indirectly indicate changes in breathing also, especially through secondary waves in the cardiac rate. Soon, no doubt, with the further improvement of such devices, respiratory processes may be independently recorded. The conveyance of impulses to rooms distant from the subject's location can be much more conveniently accomplished through electrical circuits.

The measurement of the volume or depth of breathing is read directly from the amplitude of the waves, just as the rate is read from their frequency. The ratio of the rate of inspiration to that of expiration or, briefly, the rate of expiration, is a matter of calculation with reference to the time line. The time taken to effect a rise in the curve as compared with that taken to complete a fall is the criterion in this case. Which one corresponds to inspiration and which one refers to expiration is determined by the arrangement of the apparatus. But in all such cases, as in other techniques in which curves are thus read; great care must be exercised in the selection of the critical turning point of the curve. It is always well to have the reading checked a number of times and preferably by several readers, especially since the precise crest and trough of the wave are often obscured through the introduction of a number of secondary or minor waves at these points.

7. Recording the Movements of the Striped Musculature.—Both the voluntary and involuntary movements of the striped muscles have for a long time been used as indicators of the presence or absence of affective processes and of their influence on motor performance. One of the earliest forms of apparatus was devised by Mosso and bears the name of the Mosso ergograph (ἔργον, work, Fig. 38). In this instrument the arm was clamped by means of two straps in an armrest and the fingers were sheathed in devices that were mechanically connected to styli writing on a kymograph.

Almost all ergographs have variable weights attached to the cable which moves the styli. These are lifted over a pulley, usually a number of times,

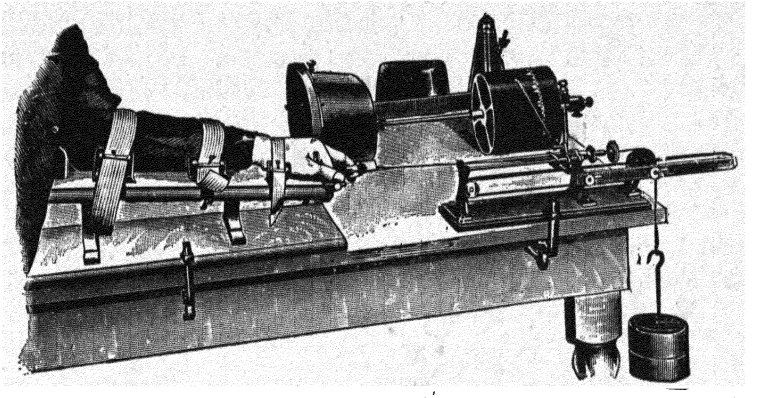


FIG. 38.—Mosso's ergograph modified by Lombard with armrest, kymograph and metronome. (*Courtesy of the C. H. Stoelting Company.*)

until fatigue is complete. Springs may, however, be substituted, and in the simplest form, by Porter, the index finger is directly attached to the stiffly mounted pointer which affords the necessary resistance to the pull. In the Sommer apparatus, the delicate involuntary movements of the hand and forearm are mechanically analyzed and recorded in regard to each of the three dimensions of space. The arm is slung in a belt at the elbow and the fingers rest on a bar whose tridimensional movements are then factored out and recorded by three styli. A great variety of forms are available for the purpose of recording movements of different segments of the arm or leg. Where the sheer force of the movements is to be directly measured, many types of dynamometers (δύναμις, strength) are available, but not much work has been done to correlate these techniques with affective phenomena (Fig. 39). Similarly, involuntary movements have been recorded by means of various types of automatographs (αὐτόματος, self-moving), which detect slight swaying movements of the hand, arm, or of the entire body. The principle is the same as that utilized in the well-known automatic movements of the planchette (Fig. 40). Still more recently the slight tremors of both the active, usually the right, hand and of the left, usually the passive, hand have been recorded on the Darrow photopolygraph in connection with emotional

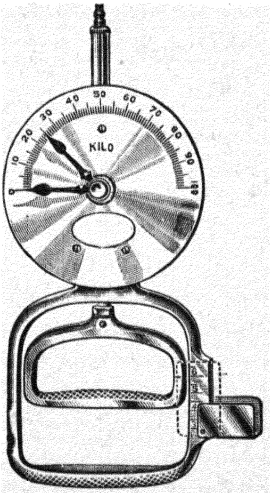


FIG. 39.—Smedley's hand dynamometer and dynamograph. This instrument is adjustable for the most suitable grip. Readings may be recorded through a pneumatic connection with a tambour. (*Courtesy of the C. H. Stoelting Company.*)

situations. In these cases the hand rests on a slightly inflated bulb or tambour.

We have already mentioned the techniques employed in regard to involuntary facial expressions, so we need go no further here. Gestures, gaits, and postures have come into this picture only incidentally and no systematic attempt has been made to study these in detail. The same statement can hardly be made with respect to the action-current technique, which has been widely used in the interpretation of stuttering, functional neuroses, alcoholism, and other disorders.[1] It has also figured largely in the explanation of sensory excitation and motor response.[2] By means of different types of electrodes and

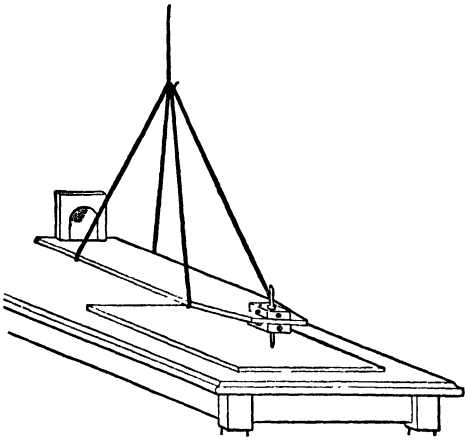


FIG. 40.—Titchener's automatograph. (*Courtesy of the C. H. Stoelting Company*)

specially devised amplifiers, the bodily current is recorded on oscillographs of various forms, including the cathode-ray oscillograph, and read in terms of σ, or units of $\frac{1}{1000}$ second, or less. But very little if any research has been done to date which would have any direct bearing on emotional disturbances. Here a promising line of attack lies before us. The topic is included in our outline with an eye to the future, since the technique bears the stamp of one of the most refined modes of attack on the neuromuscular responses of the body.

On the side of artistic singing and instrumental playing another technique appears on the scientific horizon in the records furnished by the strobophotographic recording of music and speech.[3] When such

[1] L. E. Travis, *Speech Pathology*, pp. 147–154, 162–163, 205, 1931.

[2] E. D. Adrian, *The Basis of Sensation*, pp. 48 ff., 1928.

[3] H. Seashore, *Iowa Studies in Psychol. of Music*, 2, 1936, (in press); J. Tiffin, Applications of pitch and intensity measurements of connected speech, *J. Acoust. Soc. of Amer.*, 5, 1934, pp. 225–234.

records are analyzed on the basis of fluctuations in pitch and intensity made either periodically, as in the vibrato, or as deviations from the mean or standard, it is often found that emotional concomitants are present. The relation of such performances to specific emotional experiences, whether they are merely felt or are intended to be conveyed to an audience, has not yet been intensively studied, but again we may suggest that much lies ahead in this direction.

Sherman made a study of the accuracy of judging the cries of infants below twelve days of age. In one series this was supplemented with the showing of motion pictures indicating the bodily movements of the infants. Twelve to twenty-five emotions were named by a large number of observers but there was very little relationship between their judgments and the type of stimulus used, when the latter were unknown to the observers. Knowledge about the stimulating conditions strongly influenced the decisions made. The showing of the motion pictures of bodily reactions did not improve their judgments. Colic was much less frequently reported, however, under these conditions. When a trained vocalist who had control over the intensive and protensive variations of his voice tried to express emotional utterances while he was visually concealed, the same general dispersion of judgment resulted for all tones like those intended to represent surprise, fear, and pains except those representing sorrow and anger.[1]

Altogether the striped musculature lends itself to a vast program of minute analysis since it is so intimately integrated with all other bodily functions described in this chapter. As we proceed, all kinds of physiological techniques become adapted to the needs of the psychologist who is on the trail of the affective processes. To some it may all seem like the frantic grasping after a straw, but to the more optimistic investigator it appears more like the recognition of the fact that the feelings are closely coupled with the body and that attempts of this sort to utilize physiological and other approaches may soon lead, as they are already beginning to lead, to more scientific descriptions and interpretations of the affective life.

8. Techniques Applied to Other Bodily Processes.—Some work has been reported by Brunswick, Cannon, Landis, and others on the relation between emotional situations and the activity of the gastro-intestinal tract. Both the action of the smooth muscles in stomach, duodenum, and rectum and the secretion of saliva and gastric fluids

[1] M. Sherman, The differentiation of emotional responses in infants: I. Judgments of emotional responses from motion picture views and from actual observation; II. The ability of observers to judge the emotional characteristics of the crying of infants, and of the voice of an adult, *J. Comp. Psychol.*, 7, 1927, pp. 265–284, 335–351.

have been studied. The peristaltic movements have been observed fluoroscopically with a bismuth content in the meal and by means of inflated gastric, duodenal, and rectal balloons that pneumatically register periodic contractions in these sections of the tract.

Since a separate chapter will be devoted to the electrodermal response we can give it no more than passing notice here. The electrodermal response (EDR), also called the psychogalvanic reflex (PGR) or the galvanic skin response (GSR), depends upon changes in skin resistance or other electrical manifestations correlated with the action of the sweat glands through their connection with the sympathetic nervous system. It is clear, however, that not merely the increased moisture on the surface of the skin is responsible for these electrical changes because, either when liquid electrodes are used or when maximal saturation is attained under a bandage, no variation in the moisture content can be held directly responsible. There has been much theorizing concerning the actual causal factors, but the best hypothesis suggests some inductance, capacitance, or resistance occasioned by the sweat glands themselves in terms of their chemical activity as a basis for the recorded changes in electrical units. The approaches which utilize these electrical techniques are now so numerous and varied that we shall have to discuss them separately.

Another type of technique, which has been used by Darrow and Freeman, measures the amount of respiration at the same time that an electrical record is run from the EDR. This can be calibrated in milligrams of moisture per second. Freeman has used the technique of measuring perspiration to see what are the relations between it and general metabolism. A suggestion that the organism presents a variety of metabolic rates in its different parts is technically involved in the reading of resistance changes in different skin areas and of the total weight loss due to insensible perspiration.

The basal metabolic rate has also been used by Ziegler and Levine,[1] Landis,[2] Segal,[3] Totten,[4] and others to provide indications of bodily changes during emotional excitement. As the name signifies, metabolism involves both the process of building up bodily tissue and energy (anabolism) and the process of tearing down tissues and energy (catab-

[1] L. H. Ziegler and B. S. Levine, The influence of emotional reactions on basal metabolism, *Amer. J. Med. Sci.*, 169, 1925, pp. 68–76.

[2] C. Landis, Studies of emotional reactions: IV. Metabolic rate, *Amer. J. Physiol.*, 74, 1925, pp. 188–203.

[3] H. L. Segal, H. F. Binswanger, and S. Strouse, The effect of emotion on basal metabolism, *Proc. Soc. Exper. Biol. and Med.*, 24, 1927, pp. 845–846; the effect of emotion on basal metabolism, *Arch. Inter. Med.*, 42, 1928, pp. 834–843.

[4] E. Totten, Oxygen consumption during emotional stimulation, *Comp. Psychol. Monog.*, 3, 1925, pp. 1–79.

olism). The techniques under this heading include measuring the rate of consumption of oxygen and release of carbon dioxide, the amount of nitrogen and other waste products in the urine, and similar analyses. It should be made clear that the *basal* metabolic rate is distinguished from the metabolic rate in that the former supposes a relatively inactive organism, *i.e.*, one not executing gross voluntary movements. Measurements have also been taken of the amount of glycogen and the alkali reserve in the blood. In several cases pathological subjects were used in comparison with normal individuals. The hydrogen ion concentration of the saliva and urine is much more easily measured than that of the blood. It is therefore not uncommonly used as an expressive procedure. Care has to be exercised in keeping the samples chemically pure and stable and in making the potentiometric titrations.[1]

Assuming on the basis of previous investigations that the hydrogen ion concentration of the saliva is due primarily to carbon dioxide, so that decreased salivary p_H is at least temporarily correlated with a reduction in alveolar carbon dioxide, Starr concluded that the p_H determination provides a useful index to (1) the condition of an individual as to fatigue, or as to the energy at his disposal, (2) the breathing habits of the individual, and (3) the degree of actual excitement or the degree of the excitability of an individual, especially under pathological conditions, but also as a matter of normal individual differences.[2]

An auspicious attempt has been made by Read and his colleagues to simplify greatly the complicated process of obtaining the metabolic rate through the use of a novel statistical formula based upon pulse rate and pulse pressure. They noted the fact that in a general way both of these vary directly with the consumption of oxygen, one of the factors usually included in obtaining the metabolic rate. Against several objections which were recognized, it was shown that the coefficient of correlation between variations in pulse rate and the basal matabolic rate (BMR) is 0.74 and that between variations in pulse pressure and BMR is 0.62. For purposes of roughly estimating BMR within 10 per cent of its correct value in slightly over one half of the cases presented the suggested first formula is

$$\text{BMR} = 0.75(\text{PR} + 0.74\text{PP}) - 72$$

where the values for pulse rate (PR) and pulse pressure (PP) may be

[1] For detailed directions *v.* W. M. Clark, *The Determination of Hydrogen Ions*, 1928, and I. M. Kolthoff and N. H. Furman, *Potentiometric Titrations: a Theoretical and Practical Treatise*, 1926. H. V. Gaskill, The objective measurement of emotional reactions, *Genet. Psychol. Monog.*, 14, 1933, pp. 206–212, gives a brief account of the technique.

[2] H. E. Starr, The hydrogen ion concentration of the mixed saliva considered as an index of fatigue and of emotional excitation, and applied to a study of the metabolic etiology of stammering, *Amer. J. Psychol.*, 33, 1922, pp. 394–418.

inserted.[1] Concentrating on the value of the heat output of the individual as the basis upon which the BMR may be calculated two new formulae have more recently been found useful after recording observations on 416 women and 321 men. The coefficient of correlation in these cases was slightly over 0.8 in each case. The formulae were even used in checking gross errors in the calculation of indirect calorimetry. The formulae follow:[2]

$$\text{Men:} \quad \text{Calories per sq. m. per hr.} = \frac{PR \times PP}{700} + 27$$

$$\text{Women:} \quad \text{Calories per sq. m. per hr.} = \frac{3 \times PR \times PP}{700} + 24$$

The large amount of work done with the endocrine and other internal glands might easily be surveyed in a separate chapter. Much of it, however, has no direct bearing on affective experience and the techniques employed to detect the presence of endocrine and other products in the blood are not yet absolutely dependable in every direction. For the most part the presence of adrenalin can be relatively easily detected. Almost all the methods depend upon some form of administration through injection into the blood stream or occasionally by way of mouth or upon chemical analysis of the blood or, in some cases, as in the salivary glands, upon actual recording of the secretion.

Ever since the James-Lange-Sergi controversy started, a large amount of work has been done by way of anatomical dissection to discover the functions of the various parts of the central nervous system in the transmission of emotional stimuli and their motor expression. As indicated in the outline, the various parts of the brain have been excised or at least the connections have been broken between the various segments and, in some cases with the lower animals, the entire brain has been removed (decerebration). In other instances parts of the cortex have been ablated or connections broken (decortication). Occasionally we are favored by the appearance of pathological cases in the clinic, which furnish unusual instances in human subjects of lack of functions in various parts of the brain. A considerable amount of work has also been done by Crile and others through microscopic examinations of the cortex of the cerebellum under conditions of fatigue and emotional excitement. The presence of Nissl substances in this cortex has been traced by such microscopic techniques. These have furnished the

[1] J. M. Read, Basal pulse rate and pulse pressure changes accompanying variations in the basal metabolic rate, *Arch. Inter. Med.*, 34, 1924, pp. 553–565.

[2] J. M. Read and C. W. Barnett, New formulae for prediction of basal metabolism from pulse rate and pulse pressure, *Proc. Soc. Exper. Biol. and Med.*, 31, 1934, pp. 723–725.

basis for some new theories of brain activity. In the lower animal series transections of the spinal cord just below the brain have also given us additional effects, as enumerated in our chart accompanying Chapter VIII.

This completes a sort of running account of the various techniques available under the procedure of expression. Undoubtedly many others have been overlooked, but at least a general picture is available of the manifold approaches through the various functions and processes of the body. We shall now have to confine our attention more directly to the results obtained by means of these several techniques.

9. Results Obtained by Expressive Techniques in the Circulatory System.—Because we have already detailed at length the results

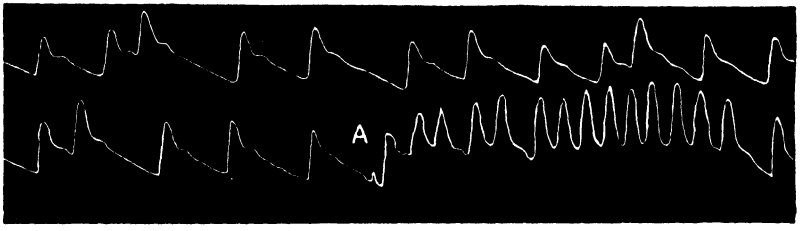


FIG. 41.—Accelerations of the cardiac pulsations through fear. The reading of the pulse was taken from the carotid artery of a dog. The normal curve is shown in the line and a half before *A*. At *A* a gun was fired two steps from the dog. Frequency of the beats was increased three-fold. [*From A. Mosso's Fear (trans. from the 5th ed. by Lough and Kiesow)*, 1896, *p.* 115, *courtesy of Longmans, Green & Company.*]

obtained by Wundt and his colleagues in regard to the defence of the tridimensional theory by means of the expressive techniques current in that day, we shall not discuss them again. Blood circulation in the brain and other portions of the body has been carefully studied for over a half of a century (Fig. 41). One of the great classics of this period appeared from the pen of Mosso.[1] An early interest centered in the changes of circulation during sleep as studied by Mosso in a woman who had lost a considerable part of her skull through syphilitic infection, in an epileptic child who had been injured and whose skull was trephined when he was eighteen months old, and in a farmer whose skull was also trephined because of an injury. Mosso concluded that in the resting stage of sleep there was a lowering in the blood volume in both the brain and the limbs. The heart rate was also generally decreased. But Shepard and others have criticized these findings. Some have come to a more generally accepted position that the curve for the arm rises for the first few hours, remains stationary

[1] A. Mosso, *Kreislauf des Blutes im menschlichen Gehirn*, 1881.

for the greater length of the sleeping period, and then contracts rapidly, especially just before awakening. In a very carefully planned piece of work Shepard found a "marked increase in volume of the brain accompanying a fall of general arterial pressure"[1] which was not due to venous congestion. Disturbances during sleep cause a rise in arterial blood-pressure and a fall of brain volume and size of the pulse. The blood vessels of the brain relax, then, during sleep and contract on awakening. No one-to-one relation was found between these changes and corresponding changes in the type of breathing, from abdominal to chest, during sleep, unless the change is abrupt and acts as an external stimulus.

Mention is made of this study because it reveals how intricate vasomotor changes are in general and how bodily position, type of breathing, and other factors affect circulation. Many writers since Mosso's day have mentioned fluctuations in blood volume and heart rate as indicative of emotional changes but have not specifically established the direction which these changes take. Most generally an increase in blood volume in the periphery of the body including the brain is reported in connection with pleasant experiences and a decrease with unpleasantness. Mosso (1879), Lehmann (1892–1899), Binet and Courtier (1896), Angell and Thompson (1899), Shepard (1905–1906), Weber (1910), and Küppers (1913) found a decrease in the plethysmographic records for volume of the arm with the emotion of fright, but a few scattering increases are noted, especially at the very outset, followed immediately by a marked decrease. In 7,000 trials on 30 subjects Anderson (1915–1917), however, found no difference between reactions to pleasant and unpleasant stimuli. This result is startling in the face of results by Mosso (1879), Féré (1887), Lehmann (1892–1899), Shields (1895), Binet and Henri (1895), Binet and Courtier (1896), Angell and McLennan (1896) with 90 per cent of cases, Angell and Thompson (1899), Bonser (1903), Gent (1903), Shepard (1905–1906), Weber (1910), Drozynski (1910), and Küppers (1913), all showing a decrease in the volume of the arm with unpleasant stimuli. But on the side of pleasantness the results are much more ambiguous, with clear indications of an increase in the volume reported only by Féré and Weber. Angell and McLennan and Drozynski found usually an increase and in some cases a decrease, whereas Gent found the opposite frequency to obtain. Lehmann reported a temporary decrease followed by a marked increase while Bonser turns this about, and all the rest give definite decreases. The reports on brain volume generally give increase in volume in the case of fright and for both pleasant and unpleasant stimuli with only an occasional reference to a decrease.[2]

[1] *The Circulation of Sleep*, p. 70.

[2] Summary based on Table I in S. D. Robbins, A plethysmographic study of shock and stammering, *Amer. J. Physiol.*, 48, 1919, pp. 285–330.

Aside from obvious variations in the techniques of these experiments and the diversity of conditions of stimulation among subjects tested, all of us may still agree that perhaps a sudden change of attention in making quick readjustments to either pleasant or unpleasant situations was accompanied by vasoconstriction in the periphery of the body and vasodilation in the brain. Robbins found in his own experiments that shock as induced by the firing of a pistol was correlated in every case with marked vasoconstriction as measured by a finger-plethysmograph and in some cases, where movement did not interfere, by an arm plethysmograph.

Using a collapsible chair as a stimulus to arouse fear Blatz found through electrocardiograph records that there was (1) an immediate acceleration of the heart (88 to 102 per minute for 5 sec.), followed by a marked retardation with a more prolonged but less marked acceleration leading later to a gradual retardation over a final long period, (2) an increase in the ventricular contraction which, though very gradually diminishing, lasted in some cases for as long as six minutes, (3) an irregularity in the cardiac periodicity. With repetition of the experiment in twelve of the eighteen subjects an adaptive effect occurred involving a reduction in the heart rate, and a decrease in degree and duration of all the effects, but when unexpected repetition occurs no adaptive effect was recorded.[1]

On the other hand, Skaggs found in the emotion of startle a retarded heart rate with an increased amplitude of the beat and an increase in the total pressure pattern. With well-devised situations of a definite emotional character, Totten found an increase of as much as twenty beats per minute in some of her subjects. Blatz suggested that the experience of fear involved both organic responses of a complex nature and a gross muscular response tending toward adjustment to the situation. While no clear-cut pattern of the responses accompanying the emotion of fear as contrasted with other emotions is here made available to us so that the emotional effects of various experiences can be compared, more work of this nature is needed to the end that through its accumulation and systematization criteria may be found for the discrimination of emotional patterns.

Weiss's excellent review of a number of studies on both normal and clinical material indicates that with few exceptions a rise in the heart rate is a common accompaniment of emotional experiences. The arterial pressure may also be increased as an indirect result of the increase in rate, but more often it may occur independently through direct stimulation of vasomotor nerves from cardiac nerve centers in

[1] W. E. Blatz, The cardiac, respiratory, and electrical phenomena involved in the emotion of fear, *J. Exper. Psychol.*, 8, 1925, pp. 109–132.

the medulla. Thus the interrelation of various organic systems is still to be presumed and an isolation of one effect away from another is at this date no longer tenable.[1]

A question which has perennially disturbed investigators who use plethysmographic records revolves around the point of gross movement of the part of the body to which the recording instrument is attached, especially in those forms which enclose a portion of the body like the finger, hand, or forearm. Movements may thus increase and in some cases decrease volumetric readings. Weber[2] carefully analyzed some of these possible errors and checked them in his work. He believed that such disturbances could be recognized in the sudden deviations of the curve and could be canceled out. With the more refined electrocardiograph techniques movements would not be so directly recorded. The vast interconnection of all bodily systems is such, however, that it is almost impossible to separate the reactions assignable to only one physiological process. We must rest our case on *major effects* and eliminate as much as possible the principle of finding a causal explanation for them. Errors may also be introduced whenever rubber membranes are used, as in the Marey tambour, since obviously the elasticity of the membrane is not uniform at all degrees of inflation. This error is overcome to a marked degree in electrically recording apparatus.

Eng's work with children and adults combined records of the circulatory system with those of respiration. Although there was a number of deviations in the five hundred-odd trials with eleven children and fourteen adults, she was able to summarize her results as follows:

	Pulse			Breathing		
Stimuli or situations	Volume	Height	Rate	Rate	Volume	Periodicity
Unpleasant	Fall	Decrease	Accelerated	Retarded	Deepened	Irregular
Pleasant..	Rise	Increase	Retarded	Accelerated	Shallow	
Depression	Fall	Decrease	Retarded (weak)	Retarded		
Excitement	Rise	Increase	Accelerated (sometimes irregular)	Accelerated	. .	Sometimes irregular

She suggested that unpleasantness and depression are asthenic or inhibitory feelings, while pleasantness and excitement are sthenic or conative phases

[1] S. Weiss, The interaction between emotional states and the cardiovascular system in health and disease, *Libman Anniversary Vol.*, 3, 1932, pp. 1181–1198.

[2] E. Weber, *Der Einfluss psychischer Vorgänge auf den Körper*, pp. 61 ff., 1910.

which, for classificatory reasons, we omit here.[1] We find a composite picture which resurrects concepts of the Wundtian tridimensional order without advancing the discussion except in the direction of showing that a widespread effect occurs in the circulatory and respiratory systems during affective experiences. There is also confirmation of the general finding, as we have before noted, that unpleasant situations tend to decrease the pulse volume and pleasant stimuli tend to increase it. With a few exceptions this is a conclusion also borne out by the summary outlined by Leschke[2] and reprinted by Beebe-Center,[3] but, of course, this table duplicates in part some of the results already enumerated above. Leschke remarks that where relatively simple mental processes like pleasantness and unpleasantness are involved, 90 per cent of the reported studies are in agreement concerning concomitant changes in pulse, circulation, and respiration. Only in the more complicated mental phenomena of the affective type do divergences appear and for the most part because the experimenter failed to control introspectively and analytically the experiences which resulted from the stimuli applied.[4] Perhaps even a more adequate explanation is to be found in Weiss's statement that "*the same degree of emotional excitement in different individuals often causes entirely different responses both in the cardiac rate and in the cardiac output.*"[5] Furthermore, in addition to a generalized constriction or dilation of the arterioles, which may show variations from individual to individual under the same experimental conditions, there may often be a variation in the regional responses of the arterioles and subpapillary venules quite independently of the rate of circulation through the area of blushing. While the face is the most common place of blushing, blushing is known to occur in any portion of the upper part of the trunk, even in regions not ordinarily exposed. The author has himself seen blushing take place across the shoulder blades. The point of all this is that in some cases deviations from the average results may be accounted for in terms of individual differences.

We are now in a position to discuss some of the work that has been done by Marston, Landis and Wiley,[6] Chappell,[7] Bryan,[8] Larson,[9] and

[1] H. Eng, *The Emotional Life of the Child* (trans. by Morrison), p 121, 1925.

[2] E. Leschke, Die Ergebnisse und die Fehlerquellen der bisherigen Untersuchungen über die korperlichen Begleiterscheinungen seelischer Vorgänge, *Arch. f. d. ges. Psychol.*, 31, 1914, pp. 27–37.

[3] *Op. cit.*, pp. 321–325.

[4] *Op. cit.*, pp. 36–37.

[5] *Op. cit.*, p. 1183.

[6] C. Landis and L. E. Wiley, Changes of blood-pressure and respiration during deception, *J. Comp. Psychol*, 6, 1926, pp. 1–19.

[7] M. N. Chappell, Blood-pressure changes in deception, *Arch. Psychol.*, 17, 1929, No. 105, pp. 1–39.

[8] A. E. Bryan, Blood-pressure deception changes and their use as an index of personality, M. A. thesis, Columbia Univ., 1930.

[9] J. A. Larson and G. W. Haney, Cardio-respiratory variations in personality studies, *Amer. J. Psychiat.*, 11, 1932, pp. 1035–1081.

others on the relation of changes in circulation, particularly of blood-pressure to emotional situations involving lying and deception on the part of the observer. An interesting incident was told by Valli to Benussi regarding a cardplayer whose bluffing was 'foolproof' except to one player, who noticed that a blood vessel in his forehead was always slightly enlarged when he bluffed. This was to him an infallible cue.[1] Among the first to point out the significance of systolic blood-pressure as an index to deception was Marston.[2] Binet and Vaschide[3] had already found that intellectual work done under a high degree of attention tended to increase the diastolic blood-pressure 20 to 40 mm. To avoid complications with this factor and other physiological conditions, such as vasomotor constrictions, Marston preferred the systolic pressure. Critics of his method have pointed out that over long periods of time it is not possible to obtain records of true systolic blood-pressure. They have suggested that only lateral variations in the brachial artery were observable. Marston found that "sudden sharp, short rises of blood-pressure betray . . . substantial lies in an otherwise true story" and that its pattern "constitutes a practically infallible test of the consciousness of an attitude of deception." The symptomatic picture was much like that of fear and rage. A total average rise in blood-pressure in ten subjects during fifty-six acts of deception was 16 mm. A falling blood-pressure curve often accompanied the act of telling the truth. Burtt was interested mainly in the problem of the ratio of inspiration to expiration but also took blood-pressure readings at intervals and thus checked Marston's work.[4] He found that with the limited number of subjects used the experimenter's judgment as to deception was about 70 per cent correct when blood-pressure was the cue. In several series it proved to be a better cue than the ratio of breathing. Rises of 4 to 12 mm. were recorded above the level produced by the excitement of the experiment and the drop in blood-pressure was unusually slow thereafter.

Chappell obtained even higher percentages of accurate judgments as to when the subject was lying, namely, 87 per cent, but he stated that there was no typical curve of changes in blood-pressure with deception when group

[1] V. Benussi, Die Atmungssymptome der Lüge, *Arch. f. d. ges. Psychol.*, 31, 1914, pp. 244–273.

[2] W. M. Marston, Systolic blood-pressure symptoms of deception, *J. Exper. Psychol.*, 2, 1917, pp. 117–163.

[3] A. Binet and N. Vaschide, Influence du travail intellectuel des émotions et du travail physique sur la pression du sang, *L'Année psychol*, 3, 1896, pp. 127–183.

[4] H. E. Burtt, The inspiration-expiration ratio during truth and falsehood, *J. Exper. Psychol.*, 4, 1921, pp. 1–23.

results are used. Variation proved to be the outstanding characteristic. The average rise for truth was 5.1 mm. whereas the average rise for deception was 20.8 mm. Excitement, however, is probably the main cause for the rise, as is shown both by the failure to obtain a marked rise when there was unemotional deception and by the possibility of obtaining a marked rise when the subject was undergoing excitement while taking an intelligence test. Bryan in turn criticized these results because correlations were found between the rise in blood-pressure and the telling of a falsehood. No controlled observations were made to show whether telling a falsehood actually involved a conscious intent to deceive. She rightly questions the usual assumption that *deceptive reactions* can be correlated with the *consciousness of deception*, especially under the artificial atmosphere of the laboratory. Her results reduce the accuracy of differentiation between telling the truth and telling a falsehood, which is not necessarily synonymous with intentionally lying, to only 69 per cent.

While the outcome of all these experiments is still, therefore, somewhat in the balance, Larson has rendered the service of bringing many of these results together in book[1] form and in summarizing his own work in this field. That pressure changes occur during conscious deception in many suspects can not be successfully denied from the experience of this writer, who has done most of his work in the atmosphere of the police laboratory. Larson and Keeler have examined some ten thousand suspected cases with an admitted failure in less than ten instances.[2] Larson suggested that intended deception may represent an actual defense mechanism "of the nature of an attempt to suppress that which may result in injury." He objected to the technique used by Chappell and others, however, in that it involved oral responses with more than one word which would in his judgment lead to uncontrolled effects. His technique required only single-word answers of 'yes' and 'no.' Larson maintained that with any initial pressure above the diastolic limit and well below the upper limit of the systolic phase, *e.g.*, about 100 mm. Hg., characteristic individual changes will occur in a record which is run. In the majority of cases reported the pressure is continuously higher during deception than it is during confession. The author believes, however, that more intensive quantitative work needs to be done and that the technique is most valuable as an additional tool in the early stages of investigation by the police, especially for the elimination of the innocent and in bringing about a confession on the part of the guilty individual. This technique is also available for problems in juvenile delinquency, as Larson has pointed out, provided

[1] J. A. Larson, *Lying and Its Detection*, 1932.

[2] L. Keeler, How science solves crime: the polygraph, *Hygeia*, 10, 1932, p. 740.

more detailed work is done on controlling other factors which are known to affect the measurements of pressure and to produce marked individual differences.[1]

Landis and Gullette claimed that in unemotional situations observers may show changes in blood-pressure to the extent of 8 to 10 mm. They found no typical individual patterns but evidence for the dependence of systolic blood-pressure on general physiological conditions. Surprise, because of its sudden and unexpected onset, gave the only definite vascular pattern of response. They did not find any criterion of differentiation between truthtelling and lying in terms of blood-pressure but in some they did discover an increase in the I/E ratio during lying. Their results on this phase of the problem were, however, so fragmentary that they make only a tentatively negative conclusion on the presumption that patterns of respiration may be just as unlikely as reaction patterns in any other major bodily system seem to be.[2] The problem of the respiratory ratio will be discussed more fully, however, in a succeeding section.

At this point it becomes necessary to evaluate the results obtained in connection with the affective changes in circulation. We notice first of all the immense complexity of effects in the circulatory system. The interdependence of the various portions of the system is marked. This is brought out by studies of the sleeping period. More work needs to be done with improved instruments which can record volumetric changes simultaneously under a variety of conditions in different parts of the cardiovascular system and over a fairly long period of time. When simple affective responses to sensory stimuli are involved, volumetric records for the arm show a decrease for unpleasantness and much less uniformly the opposite effect for pleasantness. The sudden excitement of a quick adjustment usually leads to vasodilation of the brain with a corresponding vasoconstriction in the periphery. At the same time for all suddenly appearing emotions evidence points to a momentary acceleration of the heartbeat with an accompanying increase of arterial pressure. Cannon claims that "in extreme pleasure, anger, or fright a rise of 90 mm. may occur" and that in excitement the blood is forced in a large measure "from the capacious vessels of the abdomen into other parts of the body."[3] This accounts at least in part for the positive evidence obtained in many studies of deception. It is clear, however, that in the more complicated emotional situations, no

[1] J. A. Larson and G. W. Haney, *op. cit.*, pp. 1035–1081.

[2] C. Landis and R. Gullette, Studies of emotional reactions: III. Systolic blood-pressure and inspiration-expiration ratios, *J. Comp. Psychol.*, 5, 1925, pp. 221–253.

[3] *Bodily Changes in Pain, Hunger, Fear, and Rage*, 2d ed., 1929, p. 93.

unequivocal results of a characteristic type have yet been obtained with respect to circulatory disturbances. Certainly the pleasant group can not at present be distinguished from the unpleasant, to say nothing of the various forms of feeling in each group. Future studies should be concerned with a more detailed analysis of the interrelated effects produced accompanied by descriptive reports of the experienced feelings and emotions.

Since the studies using the constitution of the blood or its acid-base ratio (p_H) as an indicator of emotional experience are not very numerous, a word in passing will be sufficient. In general it has been noted that the alkalinity of the blood increases under emotional excitement, due in all probability to the accumulation of carbon dioxide in the blood as a result of accelerated metabolism. Landis reported a rapid rise in the metabolic rate during anticipation of severe pain and a corresponding rapid fall in this rate during the pain, but the results were not sufficiently well marked.[1] Ziegler and Levine[2] and Segal *et al.*,[3] however, found positive evidence of a rise in the metabolic rate, but Segal found no consistent evidence of this sort in another group of subjects who were anticipating a major operation. This latter finding is corroborated by Totten, who found no consistent evidence of a rise in metabolic rate in terms of the consumption of oxygen when the subjects passed through a variety of emotional experiences.[4] In seven cases there was no indication of a change in the rate of oxygen consumption, whereas in six instances an increase of 5 per cent to 25 per cent occurred. It was not clear, however, whether the accompanying muscular tensions or the storing of oxygen in the air passages were more directly responsible for the additional consumption. Many of these studies reveal an unfortunate lack of control of the mental factors involved, since often the experience of the subject was not carefully analyzed and was largely inferred from the nature of the physical situation. As we have remarked before, in work on the emotions and allied phenomena, this is generally a rash procedure. More intensive qualitative and quantitative analyses on both mental and bodily aspects of the problem are now in order.

Investigating college students and children, Rich found positive average correlations in 191 cases of .30 between the p_H of the saliva and the emotional

[1] Studies of emotional reactions: IV. Metabolic rate, *Amer. J. Physiol.*, 74, 1925, pp. 188–203.

[2] *Op. cit.*, pp. 68–76.

[3] H. L. Segal, H. F. Binswanger, and S. Strouse, *op. cit.*, pp. 845–846; also H. L. Segal, *op. cit.*, pp. 834–843.

[4] *Op. cit.*, pp. 1–79.

excitability of subjects as rated by fellow workers. A further verification of the negative relation of bodily acidity and emotional excitability came from urinary determinations. Less excitable persons tend to have a more acid urine and saliva than those who are rated as excitable. Other studies, made by Starr on different types of stammerers and by Ludlum on two types of insanity, confirm these results. An element in the body which varies with its acidity is creatinine. This was also found to vary in both blood and urine with emotional excitability. The more excitable individuals indicated a lower output of creatinine in the blood in proportion to the amount of metabolizing tissue. In interpreting these results Rich suggested that during conditions of high acidity or high creatinine content the activity of the nervous system is reduced to a minimum and ultimately in extreme cases to zero. The by-products of metabolism may therefore be used chronically to stimulate or to depress the nervous system in the rôle of internal secretions.[1]

Ferrari and Lamson have also reported an increase in the red corpuscles of the blood during emotional excitement. Under a variety of conditions the increases range in human subjects around 10 per cent, with wide differences between excitable and phlegmatic types, and in cats, according to Cannon, around 27 per cent.[2] The main functional mechanism for the increased production of red corpuscles, or erythrocytes, appears to be the spleen, where blood may become concentrated. There are two modes of arousal, directly through the splenic nerves, or indirectly through adrenalin in the blood.[3] Under normal conditions it is likely that exciting emotions are accompanied by impulses through the sympathetic system, which cause a contraction of the smooth muscle in the spleen. This discharge adds to the total blood volume with only a minimal concentration of red corpuscles. But when excitement and muscular activity are prolonged, the spleen becomes relatively and gradually denervated and, with increased effect from the presence of adrenalin in the blood, contraction still occurs, discharging a supply of blood that has been highly concentrated during storage. Thus the percentage of red corpuscles may rise. The spleen is also held responsible for an increase of about 13 per cent in the white corpuscles of the blood during emotional disturbance. Benharnou and his colleagues have definitely demonstrated that this abrupt but lasting splenic contraction does not occur in normal individuals under emotional excitement. The accompanying polyglobism is shown to continue for several minutes after the excitement is induced.[4] Barcroft and his colleagues have found, however, that volumetric changes do occur in the spleen during emotional stimulation.[5]

[1] G. J. Rich, Body acidity as related to emotional excitability, *Arch. Neur. & Psychiat.*, 20, 1928, pp. 589–594.

[2] *Bodily Changes in Pain, Hunger, Fear, and Rage*, 2d ed., p. 182, 1929.

[3] *Ibid.*, pp. 188 ff.

[4] E. Benharnou, —. Marchioni, and —. Nouchy, La spléno-contraction à l'émotion chez l'homme normal, *C. r. Soc. de Biol.*, 100, 1900, pp. 461–463.

[5] J. Barcroft, Some effects of emotion on the volume of the spleen, *J. Physiol.*, 68, 1930, pp. 375–382.

The chemical content of the blood has been frequently tested also for sugar of blood (glycogen), a direct effect of the secretion of adrenalin during emotional excitement. This state, known as glycosuria, can also be discovered through urinalysis. Cannon, repeating the experiments of Böhm and Hoffmann, found evidence of this sort while cats were confined in a comfortable holder for thirty minutes to five hours. The average length of time required to bring about a glycosuria was less than forty minutes. No sugar was discovered during the day following the experiment. It appeared earliest in those animals which soon showed signs of being frightened or of being in a rage at the imposed restraint; in animals which remained fairly calm it appeared much later. Similar experiments have been made on other animals, like the dog and rabbit, and on a number of human subjects. The human subjects were tested before and after taking academic examinations and immediately after a football game. In all instances definite increases of glycogen were found, but from the psychological angle it is not clear whether the emotional excitement, or the mental and physical efforts involved, or both together, produced these results. Whitehorn failed to find any uniform rise in glycogen in 32 psychotic individuals who were emotionally excited. The hyperglycemia which Cannon found in cats was seldom if ever manifested in these cases because "presumably it is the large human cerebral cortex which is responsible for the inhibitory restraint."[1] Further tests involving a minimum of intellectual or physical effort but with a decided emotional excitement in man would be illuminating, especially in view of Cannon's own statement of the recognized fact that glycogen is the "optimum source of muscular energy," in the production of which the adrenal glands are essential factors.

A summary of the work regarding the basal metabolic rate (BMR) has been made by Landis. After a critical review of the existing literature on the subject in which it was shown that thyroxin is probably too slow in its action to account for the rapid changes in metabolism that usually accompany emotional disturbances while epinephrine increases metabolism rapidly, he concluded from previous studies that the change in the metabolic rate is not indicative of any particular psychosis or of the emotional nature of that psychosis. The studies of Ziegler and Levine showed that in the majority of instances unpleasant emotional reactions to suggested situations are accompanied by a decreased metabolic rate. This is also true of animals which have undergone severe traumatic or surgical shock. Increased superadrenal

[1] J. C. Whitehorn, The blood sugar in relation to emotional reactions, *Amer J. Psychiat.*, 13, 1934, pp. 987–1005.

activity, greater activity of the central nervous system, expansion of the capacity of the bronchioles for the storage of oxygen, and increased muscular tonus and tension in the voluntary musculature are possible causes of a higher metabolic rate in other emotions. In his investigations musical selections of the jazz type, painful faradic stimulation, and deprivation of food and sleep were used as stimuli. Gastric and rectal balloons were available to record contractions during a check series in connection with a standardized diet. A rapid rise in the metabolic rate appeared in the anticipatory period with a quick fall during electrical stimulation, like that of surgical shock. Emotional stimulation did not inhibit contractions of the stomach. The 'anger' reported by two subjects was accompanied by both increases and decreases in the metabolic rate. The musical selections did not affect the rate. While Landis stated that emotional disturbances in themselves do not lead to uniform changes either in the direction or in the magnitude of the metabolic rate, we must leave the question open for further investigation because only three subjects were used. While elaborate precautions were taken, repeated trials were not made and the data under the heroic conditions of the experiment were necessarily meager.[1] In a later experiment interruptions of gastric contractions apparently occurred in one subject and increased contraction in another; also stoppage of rectal contractions was noted. The author was in doubt, however, about the possible interference of diaphragmatic spasms.

A careful experimental study has recently been made by Rowles and Patrick on the relation of the BMR and other bodily responses to emotional situations. They tried to discover if ideational as well as sensory stimuli influence metabolic rate, blood-pressure, and the electrodermal response. Some of their work anticipates the discussion of electrical phenomena which is to follow, but at the same time the investigation illustrates the trend toward the simultaneous recording of multiple responses from the body. Seven male observers from nineteen to twenty-nine years of age were used. With one exception they showed a definite rise in metabolic rate for both sensory and ideational stimuli, but no difference in this rate was apparent for the two groups of stimuli. The blood-pressure curves showed a difference, however, in connection with verbal stimulation, which generally produced greater changes. During actual application of both sorts of stimuli marked irregularities occurred in these curves with greater amplitudes and longer duration than the superimposed respiratory patterns. The electrodermal responses were reserved for further checking.[2]

[1] Studies of emotional reactions: IV. Metabolic rate, *Amer. J. Physiol.*, 74, 1925, pp. 188–203; *V.* Severe emotional upset, *J. Comp. Psychol.*, 6, 1926, pp. 221–242.

[2] E. Rowles and J. R. Patrick, The effect of various stimuli on the basal metabolic

Another type of investigation shows a definite change in the number of lymphocytes in the blood during emotional strain. By means of blood counts made on medical students before and after taking certain course examinations, Farris established the fact that the percentage of lymphocytes increased markedly, in several series to almost double the normal percentage. Menkin had already shown that emotional excitement of ten to fifteen minutes' duration in cats caused an average increase of 13 per cent with a return to normal within thirty minutes thereafter. While no careful introspective returns are available in Farris's experiments to indicate whether there were actual emotional experiences involved in the situation of taking course examinations, we can assume that such was the case. Otherwise we should want to suggest that the results indicated only mental strain. In the case of a football team which he also tested thirty minutes before and thirty minutes after a game, there was an increase in polymorphs (from 53 per cent to 70 per cent) and a decrease in lymphocytes (from 45 per cent to 27 per cent) after the game. Aside from effects of fatigue, which undoubtedly are operative, this might be interpreted to mean that the period of excitement and tension before the game was followed by comparative relaxation and a return to normal conditions after the game. In any case there seems to be a profound complex effect of the nervous system on the blood count, but the physiology of lymphocytosis is not well understood at the present time.[1]

A large number of studies have occupied themselves with the physiological effects of musical selections. Here we find the conditions of experimentation so varied from one investigator to another and the mental problem so complicated that no uniformity of results can be expected. On the mental side the problem becomes complex because not only are affective or emotional factors involved but phenomena related to attention, rhythm, major and minor modes, consonance and dissonance, and types of musical selections are also often present.

A serviceable summary of the various phases of the subject has been made by Diserens[2] and Weld.[3] Féré and Scripture have found that music exercises a dynamogenetic effect on the body in proportion to the pitch and intensity of the notes. Patrizi discovered that it increased the volume of the brain but that sad or gay music could not thus be differentiated. Mentz claimed that the feeling of pleasantness with consonances, intensive changes of the notes, and the approach of the finale were accompanied by a retarded

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rate, the blood pressure and the galvanic reflex in man, *J. Exper. Psychol.*, 17, 1934, pp. 847–861.

[1] E. J. Farris, Increase in lymphocytes in healthy persons under certain emotional states, *Proc. Soc. Exper. Biol. & Med.*, 32, 1934, pp. 338–339.

[2] C. M. Diserens, *The Influence of Music on Behavior*, pp. 125–210, 1926.

[3] H. P. Weld, An experimental study of musical enjoyment, *Amer. J. Psychol.*, 23, 1912, pp. 245–308.

pulse. Binet and Courtier found that all musical stimuli produced an acceleration of the heart beat and respiration while Foster and Gamble attributed the latter change to the effort of attentive concentration. Shepard obtained more rapid pulse records, however, only with agreeable and exciting music and a shorter pulse with agreeably depressing music. Weld agreed with Foster and Gamble in their interpretation, finding an increased heart rate and a tendency of respiration to become faster and more irregular. Diserens also added that music increases bodily metabolism and that in general the effects on the volume, pulse, and blood-pressure are marked but variable. Hyde also measured the pulse rate, the systolic, diastolic, and pulse pressures, the relative velocity of blood flow, and took electrocardiograms of the contraction of the ventricular muscle.[1] Individual differences in appreciation and understanding of musical effects were noted and an increase in cardiovascular activity was reported for 'march' selections. In one subject an unexpected Indian war-song effect produced in this activity a drop not unlike that of surgical shock. In many respects the interpretations of the work are uncritical and no detailed results are given.

10. Results Obtained by Expressive Techniques in the Respiratory System.—Closely allied to circulatory disturbances from the physiological standpoint as well as from their mental import are the changes recorded in the respiratory system. Again we must refrain from repeating the results obtained in defense of the Wundtian tridimensional system. Many of the results of breathing are tied up, of course, with curves of the circulatory manifestations. Following the outline of Leschke, referred to above, which includes results bearing on the Wundtian controversy, we find somewhat unequivocal results for sensory pleasantness and unpleasantness on the level of the simple affective processes. Zoneff and Meumann (1901) and Alechsieff (1907) found that the respiratory rate increased with pleasant stimuli and decreased with unpleasant stimuli, with an approximately opposite effect on the depth of breathing in both cases. The latter results were also obtained by Gent (1903). More recently numerous investigations have been made on normal and abnormal subjects and on suspected criminal cases together with situations involving deception under laboratory conditions.

Here the work of Benussi (1914) stands out as providing a point of departure for an entire line of researches. The earlier investigations of Zoneff and Meumann (1903), which were perhaps the most analytically controlled of all those that have appeared, showed that changes

[1] I. H. Hyde and W. Scalapino, Influence of music on electrocardiograms and blood-pressure, *Amer. J. Physiol.*, 46, 1918, pp 35–38; Effects of music upon electrocardiograms and blood-pressure, *J. Exper. Psychol.*, 7, 1924, pp. 213–224; also condensed in M. Schoen, *The Effects of Music*, Chap. IX, 1927.

in breathing, much more than in the pulse, reflected the feelings of pleasantness and unpleasantness in a great variety of stimuli. These workers also emphasized the function of attention in heightening the effects of the feelings.[1] Benussi claimed that not a gross measurement of the frequency or of the depth of breathing was the cue to the inner affective life, but what he called the "distribution of innervation of the single phases of breathing" or what has been called the respiration ratio (I/E). He recognized that willful lying and willful truthtelling undergo many gradations in which the personality as a whole is more or less involved and in which the vehemence of response might easily pass from minimum to maximum degree and complexity. This might be expressed by the difference between the ratio or quotient before and the ratio after the response. In any case as an average phenomenon, the ratio of three to five respirations before the truthtelling response was greater than that before lying and the ratio after truthtelling was smaller than that after lying—in other words, these ratios are inversely related.[2] We have already indicated that Burtt repeated these experiments after some preliminary work with Troland and Marston during the war; in this investigation the results from respiratory records were negative. The procedure of deception was followed in about the same manner with spectators present as was Benussi's procedure. Burtt found less correspondence between the ratios and the type of verbal response than Benussi obtained and no significant correspondence in some of his series, but he attributes this to the waning effect of habituation. In questioning subjects regarding an imaginary crime in the presence of a jury, a successful diagnosis in 73 per cent of the cases was obtained. But he found at least in one of his crucial series that the measurement of systolic blood pressure is of "greater diagnostic value" than is that of breathing.[3] Landis and Wiley in an artificial situation found that respiratory patterns had a diagnostic value of only 6 per cent greater than chance. But on another occasion Landis found that there was a definite change in the respiratory

[1] P. Zoneff and E. Meumann, Ueber Begleiterscheinungen psychischer Vorgänge in Athem und Puls, *Philos. Stud.*, 18, 1903, pp. 1–113 (N.B. p. 69).

[2] Klemm has conveniently expressed the formula thus, where $\frac{I}{E}(a)$ is the ratio *before* the response (*ante*) and $\frac{I}{E}(p)$ is the ratio after the response (*post*):

$$\text{Lying } \frac{I}{E}(p) : \frac{I}{E}(a) > 1$$

$$\text{Truthtelling } \frac{I}{E}(p) : \frac{I}{E}(a) < 1$$

[3] *Op. cit.*, p. 23.

curve at the beginning of emotional excitement and that the effect gradually disappeared. The chief uncontrolled factor in many of these investigations is again not the depth or rate of breathing but the depth and extent of the experience itself. Obviously if you carry on these experiments at police headquarters with individuals who are or are not criminally involved, so many social attitudes and personal interests are at stake that a high degree of emotional excitement, except in the most hardened criminals, prevails; but the conditions for carefully controlled experimentation are mainly unfavorable in other respects. If you present analogous situations in the laboratory with better chances of control and with the possibility of introspective records, the high degree of excitement and the vital self-interest in the outcome amounting, as several experimenters have stated, to strong fear, are mostly lacking. Or again in the latter case, with scores of trials necessary, habituation enters the picture. These obstacles are not insuperable, but, if they are recognized, experimental procedures may be much improved to the end that the forthcoming results may be made more consistent.

Feleky gave high rank to respiration when she stated that "we may safely say with Bell and Mosso that the emotions are principally reflected in the muscles of the face and those of respiration." Working with six subjects and with what she chose to call the six primary emotions of pleasure, pain, anger, wonder, fear, and disgust, she was able to obtain somewhat consistent, but not statistically valid, average distinctions between them in terms of respiration. While there were fairly wide individual variations in the respiration rate with these imagined and recalled emotions, even in the case of repetitions of a given emotion in a single subject, she claimed that these emotions may be distinguished by their average ratios, which were (normal breathing averaging $I/E = 0.805$): laughter 0.30, hatred 0.515, disgust 1.08, pleasure 1.11, anger 1.48, pain 1.546, wonder 2.49, and fear 2.66. If the last figure holds for a still larger number of subjects under actual fear during a cross-examination, it may throw light on the validity of the respiratory ratio after conscious deception. Lying hardly ever entirely removes the possibility of being found out. Where this is an intensely vital matter, fear may then be felt.

Klemm worked with six prisoners on trial under well-controlled conditions repeating Benussi's technique in connection with the ratio of respiration. His results do not confirm those of Benussi because the process of lying and truthtelling was overlaid with a variety of concomitant emotional attitudes which were equivocal in their total significance.[1] This sort of study is contrasted in its degree of experi-

[1] O. Klemm, Ueber die Atmungssymptomatik bei Untersuchungsgefangenen, *Neue psychol. Stud*, 5, 1929, pp. 113–132.

enced feeling or emotion with the much milder form of affectivity called out in the Cason study of breathing and movement responses using visual presentations of many different types of pictures. Emotions felt were named by the subjects from a prepared list and the degrees of pleasantness and unpleasantness were reported on a scale of +3 to −3. A record of gross bodily movement was transmitted through the chair, which was mounted on springs. The apparatus registering changes in breathing was a specially constructed device which fitted around the trunk. Latent time of response, *i.e.*, the period between the first presentation of the picture and the reported arousal of the emotion, was also noted through a signal system. Dislike and curiosity gave the longest latent times, and horror, repulsion, anger, hunger, humorousness, love, and amorousness gave the shortest latent times. Horror, repulsion, anger, sadness, sorrow, love, amorousness, and passion had the longest experienced duration, while dislike, annoyance, and amusement were the shortest in duration. The volume of breathing, as calculated on a transmuted score for each individual with a maximal reading of ten, was greatest for love; the smallest amount of bodily movement occurred for hopelessness. No reliable difference was found, however, for average scores of breathing or bodily movement as a distinguishing characteristic of pleasant or unpleasant feelings, or of weak or strong feelings; breathing and bodily movement are nevertheless positively and definitely correlated. While the latent time for pleasant and unpleasant emotions is approximately the same, it is definitely shorter for emotions that are decidedly pleasant or unpleasant as compared with those that are mild or indifferent. The unpleasant emotions have, however, a longer actual duration when they do arrive. This is true also of strong emotional feeling as compared with weak emotional feeling.[1]

Another study combining the expressions of excitement mediated by the pulse, respiration, and bodily movement, as manifested in the steadiness of the hand, was made by Skaggs.[2] The Lombard sphygmograph was placed over the left carotid artery; thoracic and diaphragmatic pneumographs were used; and steadiness was recorded by means of the Whipple steadiness tester. An automobile horn and vigorous electrical shocks were used as stimuli. The results of these startles gave a momentary respiratory inhibition followed by a more lengthy period of acceleration; with a characteristic inspiratory move-

[1] H. and E. B. Cason, Affectivity in relation to breathing and gross bodily movement, *J. Gen. Psychol.*, 9, 1933, pp. 130–156.

[2] E. B. Skaggs, Changes in pulse, breathing, and steadiness under conditions of startledness and excited expectancy, *J. Comp. Psychol.*, 6, 1926, pp. 303-318.

ment, an increased amplitude for both thoracic and abdominal breathing and a definite irregularity in the unsymmetrical cycles were found. Landis discovered an augmented respiratory rate, "a deep, gasping thoracic respiration followed by an increasing tendency toward rapid shallow breathing" after the immediate irregularity accompanying electrical stimulation.[1] Skaggs also found that the heart rate was retarded and the increased amplitudes indicated a corresponding increase in blood volume wherever such changes occurred. The results of the steadiness test were not unequivocal because a practice effect was involved where steadiness was not decreased. With five men and five women as subjects the experience of expectancy of a severe shock was further investigated, but the effect on pulse and breathing was approximately the same as before. Again the marked inspiratory movement was significant. A feeling of tension and a decrease in steadiness distinguished this feeling of expectancy, however, from that of startle, indicating a lack of control of the skeletal musculature in a period of more intense excitement during anticipation.

In summarizing these studies we again find that when simple affective stimuli are used, even though they evoke rather mild affective experiences, the results obtained in terms of changes in respiration are much more uniform than when more complex emotional experiences are involved, even though they be of rather intense nature. In the Leschke and Beebe-Center tables it is noted that sensory pleasantness is usually accompanied by an increased frequency and a diminished depth of respiration, while for unpleasant sensory stimulation the reverse of both these phenomena obtains. When we go to the higher levels of the affective life either by way of intensive changes or by way of growing complexity of experience, the returns become somewhat more equivocal. There is no doubt that the respiratory system is affected - sometimes quite violently. The direction, degree, and kind of response, however, show not only considerable variation from study to study but from subject to subject. At the present state of our knowledge this may be explained on the grounds that, on the one hand, techniques and stimulating situations still suffer for want of more adequate standardization and that, on the other hand, individual differences in respiration responses exist which can not be submerged in average returns. It is more likely that henceforth research will follow the direction (*a*) of investigating *patterns* of respiratory responses taken over considerable periods of time and (*b*) of recording by means of polygraphs a great variety of bodily symptoms at the same time in the case of each individual subject.

[1] Studies in emotional reactions; *V.* Severe emotional upset, *J. Comp. Psychol.*, 6, 1926, pp. 221–242.

Most of the studies with pronounced emotional upset show a temporary interruption of the regular respiratory rate, giving (1) a sort of 'gasp' almost immediately on perception of the arousing situation or reception of the stimulation, followed by either (*2a*) an increased amplitude of respiration at a retarded rate or (*2b*) a decreased amplitude at an increased rate, and establishing (3) an irregularity in the breathing pattern for several minutes to come. The inspiration-expiration ratio appears also to be significant if the work is carefully done.

11. Results from the Striped Musculature.—We have already described in detail the responses of the facial musculature. Incidentally we have noted, especially in connection with the general James-Lange-Sergi theory and its successors, the widespread bodily movements involved in posture, gait, and gestures. Many of these adaptive movements have been discussed in relation to the evolutionary hypothesis and kindred theories. There remain some special studies which have attempted to correlate different types of bodily movement with affective experiences. Weiss pointed out that the so-called expressions of the emotions appear to be only 'secondary reactions,' which under the reduced activity of civilized life have little biosocial utility. They are regulatory mechanisms which indirectly produce effects on the endocrine system and on such other systems as, for example, the restoration of the amount of blood sugar (glucose) to the normal level of .12 to .15 per cent through the activity of the liver in converting glycogen into glucose.[1] The entire system of endocrine glands of internal secretion act as a regulating mechanism by which nervous and muscular tissue is primed and prepared to release sufficient energy to meet the stimulating situation.

Whatever the point of view may be in regard to the efficiency of the organism to meet sudden demands made upon it, we may agree with Weiss that underlying most research on the involuntary and voluntary movements made during emotional excitement is the hypothesis of vestigial or actual utility in the process of adjustment. We recall the theories involving the avoidance of noxious and the pursuit of beneficial stimuli and situations. Similarly it often follows that pleasant experiences increase muscular activity and unpleasant stimuli decrease it. Külpe made the statement that "pleasurable states are regularly accompanied by increase of the force of voluntary muscular action, and unpleasurable states as regularly by its diminution."[2] Titchener said:

"When a *very pleasant* stimulus is applied the curve drops a little, and then quickly rises again, to a point above the level of the normal. This higher level, relative to the normal, is maintained till the end of the experiment.

[1] A. P. Weiss, *A Theoretical Basis of Human Behavior*, 2d ed., pp. 400–421, 1929.

[2] *Op. cit.*, p. 245.

When a *very pleasant* stimulus is applied, the curve takes a decided drop; then recovers a little; but remains for a long time (if not till the end of the experiment) relatively lower than the normal. . . . The pleasant stimulation makes us stronger, the unpleasant makes us weaker."[1] These statements refer to curves obtained with a dynamometer registering kilograms of weights lifted at intervals of time. Kilograms of weight are then plotted as ordinates and seconds of duration as abscissae. While citing no experiments of their own Külpe and Titchener were doubtless aware of Féré's work (1885) but probably not that of U. Mosso (1889), which was published much later (1909). Dumas (1900) reported similar results in connection with psychiatric patients who experienced joy and sadness during periods of over a week. Other observations were taken under normal conditions with similar results.

Soon, however, these uniform results began to break down under further experimental attack. Störring (1906), Rose (1913), and Ernst (1926) began to reverse the situation, so that unpleasantly toned stimuli registered markedly increased muscular energy. Ernst supposed that unpleasant stimuli might have either excitor or depressor effects and that variation in the reaction of the muscles, especially as regards the duration of the contraction, was related somewhat to the intensity of the stimulus.[2] An increase in the volume of the arm was also noted and explained on the basis of overcompensation for the amount of energy to be released. Since the intensity of the stimuli, which were bitter tastes, was not controlled, it is possible that greater energy was released in conjunction with the high degree of unpleasantness. Here the matter must rest until further investigations more rigorously attack the problem with the variable factors under control. Certainly when we come to the more complex affective states like unpleasant surprise or startle, there is often a violent movement which, as Blatz has shown, is subject to diminution with time (adaptive effect).[3] On many occasions, as with rather violent physical fear, a sudden contraction, followed by an inhibition of muscular movement, to the point of 'weakness,' 'lassitude,' 'knees giving way,' *etc.*, and in the lower animals to the point of cataplexy, can obviously take place. Usually, however, some violent motion then occurs. All of this discussion illustrates the fact that, as we indicated in connection with other bodily expressions, nothing but a record over some period of time will do. A temporal pattern is much more illuminating, especially if the intensity of the experience is checked through individual report.

[1] *Experimental Psychology*, Vol. I., Pt. II, pp. 165–166, 1901.

[2] A. Ernst, Dynamographisch-plethysmographische Untersuchungen über die Einwerkung von Unlustgefühlen auf äussere Willenshandlungen, *Arch. f. d. ges. Psychol.*, 57, 1926, pp. 445–488.

[3] *Op. cit.*, p. 132.

Another interesting development has taken place respecting the direction of movement—the oft-repeated notion that we move involuntarily toward pleasant stimuli and situations and away from unpleasant ones: the principle of pursuit and avoidance. Münsterberg made a strong case for this view on behalf of his general theory of movement or dynamogenesis. In terms of these reflex movements he moreover defined pleasantness and unpleasantness.

"We have a definite basis for a physiological theory if we observe the bodily reactions connected with the sensory pleasure and displeasure. They indicate clearly the antagonism of the feelings themselves. If the stimulus is pleasant, the movements tend to make it go on; if it is unpleasant, the movements tend to stop it. The stimulus continues, if we actively approach it or if we passively yield to it, and it ends if we move away or throw it off. Two groups of antagonistic movements are evidently especially characteristic. If the stimulus is disagreeable, the organism reacts by a contraction of the flexor muscles. It is a cramplike shrinking of the body, a tense strain. If the impression is agreeable, the organism expands, and the extensor muscles are active."[1]

This general statement was probably based upon some results obtained in 1892 which showed that, in making arm movements while blindfolded, distances of 10 and 20 cm. were overreached on the average in the direction away from the body (centrifugal) when made under pleasant stimulation, and underreached in the opposite direction *i.e.*, toward the body (centripetal), thus indicating an overemphasis of extensive movements. The opposite of this was true in both directions under unpleasant stimulation, signifying an overemphasis of contractive (flexor) movements. Under conditions of fatigue and sorrow, movements in both directions, centrifugal and centripetal, were underreached, however, whereas under conditions of excitement and joy the movements were exceeded in both directions. In the former case both extensor and flexor muscles were partially inhibited, while in the latter case both sets were excessively facilitated.[2]

Because Dumas misunderstood a partial citation of these results by Ribot,[3] he believed that his own data obtained with pathological subjects contradicted those of Münsterberg when in fact they were in agreement.[4] Further confirmation came from the work of Remmers and Thompson.

[1] H. Münsterberg, *Psychology, General and Applied*, p. 199, 1914.

[2] H. Münsterberg, Die psychophysische Grundlage der Gefühle, *Proc. Int. Cong. of Exper. Psychol.*, London, 1892, p. 132.

[3] *Op. cit.*, pp. 52, 53.

[4] *La Tristesse et la joie*, pp. 334–335, 344, 1900.

They adapted to their purposes with eighty-four subjects the procedure outlined by Langfeld and Allport[1] in which lines are drawn under imagined pleasant and unpleasant conditions. As they point out, of course, a wide range of emotional and affective conditions can be imagined without an adequate control over the intensity and variety of those conditions. They found that the total length of the pleasant lines was over twice as great as the total length of the unpleasant lines or, putting the data into another form, the pleasant lines averaged 5.435 per cent longer per line, whereas the unpleasant lines averaged 2.459 per cent longer per line. The results were checked statistically and empirically and were discovered to be significantly greater than chance occurrences in the mass, but there were wide variations from individual to individual performance. As a group they seem to indicate, however, that the extensor movement usually made in drawing a line is greater under pleasant conditions than under unpleasant conditions. In individual cases, nevertheless, it is rash to make this same argument, since large individual differences did occur. It is also hazardous, in the present state of our knowledge, to imply that only an extensor movement was made, because the muscles are complexly involved and a just balance between the extensors and flexors is maintained.[2]

When we go over into the domain of involuntary movements, we find that Burtt and Tuttle, for example, have found a 16 per cent depression in the patellar tendon reflex. In some preliminary experiments with affectively colored verbal stimuli that were visually presented, the most pronounced depression occurred with words representing sensory qualities and disgust, although one subject showed the greatest depression for 'death.' For pleasantly toned words the reaction is not so clear as for unpleasant ones. A similar depression occurred but it was slight and inconsistent.[3] While these trials constitute merely a beginning, they indicate that with unpleasant associations there is a reduction of efferent energy manifested in the reflex commonly known as the knee-jerk. That the contrary expansive movement with an increase in muscular energy did not occur may be due to the fact that it is difficult to produce pleasantly toned affective responses of high degrees of intensities, especially with verbal stimuli.

[1] H. S. Langfeld and F. H. Allport, *An Elementary Laboratory Course in Psychology*, pp. 146–147, 1916.

[2] H. H. Remmers and L. A. Thompson, Jr., A note on motor activity as conditioned by emotional states, *J. Appl. Psychol.*, 9, 1925, pp. 417–423.

[3] H. E. Burtt and W. W. Tuttle, The patellar tendon reflex and affective tone, *Amer. J. Psychol.*, 36, 1925, pp. 553–561.

Continuing in this direction are some investigations made by Young, in which he found "abundant evidence for the correlation between unpleasantness and movements of avoidance." Pleasantness, however, was not generally correlated with involuntary movements of pursuit. He insisted that the bodily response for pleasantness was slight—more like that of relaxation. The organism "does nothing."[1] Also using olfactory, cutaneous, and auditory stimuli, Corwin repeated these experiments under conditions which would favor seeking movements, should these occur. Young's conditions, she said, were such that "a seeking movement would be not only unnecessary but also impossible," and his instructions required the observers to be "passive and receptive." The olfactory and the auditory stimuli were gradually moved away from the observer and in the case of cutaneous stimuli, the stimuli were moved across the observer's forehead or nose. The movements of his head were graphically recorded in the olfactory series. Introspective reports were also made. In 55.7 per cent of the cases classified as pleasant Corwin found definite movement of tendencies to move reported, while in 66.6 per cent secondary reactions characteristic of pursuit or desire "to maintain the experience" were also recorded.

She therefore concluded that "definitely seeking or maintaining reactions to pleasant stimulation" are found in 84.3 per cent of the total number of pleasant cases. She verified Young's finding, however, that responses to unpleasantness are quicker and more intense than to pleasantness. She conceded that with mild and stationary pleasant stimuli the reaction of the organism is that of relaxation *with a certain degree of expansion* as contrasted with that of involuntary *contraction* toward mildly unpleasant stimuli. Actual pursuit or tendencies toward pursuit are manifest with strongly pleasant stimuli just as definite withdrawal accompanies strongly unpleasant stimuli.[2] Young again attacked the problem with Corwin's criticisms in view but with a more comprehensive procedure, to make comparison of both positive and negative involuntary reactions with unpleasant as well as with pleasant stimuli possible. In other words, Corwin had not reported the frequency of movements of pursuit with unpleasant stimuli and of movements of avoidance with pleasant stimuli. He questioned, moreover, as she herself intimated, whether movements of pursuit were not intrinsically expressions of pleasant feeling. Only two observers were used, but the results appeared to be unequivocally in the direction of identifying the involuntary movements as those accompanying sensory attention. When there is no incentive to seeking, as there was in Corwin's experiments and not in the two Young experiments, Young concluded again, there is a reflex or deliberate tendency to withdraw from unpleasant stimuli or situations, especially when suddenly presented; and when the contrary movement of

[1] P. T. Young, Pleasantness and unpleasantness in relation to organic response, *Amer. J. Psychol.*, 32, 1921, pp. 38–53.

[2] G. H. Corwin, The involuntary response to pleasantness, *Amer. J. Psychol.*, 32, 1921, pp. 563–570.

seeking is found, it is the result of a specially implanted incentive, or else a phenomenon of sensory attention and not necessarily of feeling. In fact he went so far as to recommend that the traditional hedonistic doctrine of pursuit and avoidance be abandoned.[1]

The upshot of all these discussions is that at this writing no doubt remains about the involuntary movements attending fairly strong unpleasant stimulation. The question concerning the forward-moving, expansive reactions in the presence of pleasant stimulation of any comparable degree of intensity is clouded by the fact that pleasant stimuli of this sort are a rarity under laboratory conditions. If, as Bentley, Cannon, Crile, and others have maintained, the majority or perhaps all of the affective experiences involve predicaments which the organism faces, all that we can now say is that the avoidance of unpleasant stimuli is the typical affective reaction. It possesses a long biological history which is still being made. We continue to avoid unpleasant stimuli and circumstances. Seeking after pleasant experiences is, however, not nearly so active and, in the present environment, highly conditioned by training and inhibitory influences which harbor ideational and more remote factors. All that can naturally and normally now happen is the relaxed continuation of the existing state of things. Wundt's 'drawn' mouth in disgust dating back to the resistance against the entrance of obnoxious food and the 'pursed' lips in the 'sweet' expression representing anticipation of desirable food are unequally operative today. The reflexes of the former type are still strong, deep seated, and widespread over the whole body; the reflexes of the latter type are greatly modified or eliminated. This point can be adequately proved only by some experiment in the future which will try, as Young suggests, to test the relative strength of the two sets of responses by 'cross-conditioning,' namely, attaching the reaction of pursuit to unpleasant sensory stimuli and the response of avoidance to pleasant sensory stimuli.

An example of studies which use polygraphic recordings of a variety of responses, along the lines made possible by the Behavior Research photopolygraph described in a previous section, is Gaskill's investigation of the effects of emotional stimulation on respiration, circulation, involuntary movement, and p_H of the saliva. Continuous breathing records were made with a Sumner pneumograph strapped about the chest and continuous blood-pressure records were also taken with approximately 32 mm. of mercury as the basic point of departure. The pressure was raised to 50 mm. when the heart rate was calculated. Actual systolic and diastolic readings were also

[1] P. T. Young, Movements of pursuit and avoidance as expressions of simple feeling, *Amer. J. Psychol.*, 33, 1922, pp. 511–525.

made at intervals. Involuntary arm movements were recorded from a planchette suspended from the ceiling. The Kolthoff and Furman technique was used in obtaining potentiometric titrations for salivary p_H. The stimuli included the reading of a page of figures and a short story, the presentation of a western bull snake, the sounding of a Klaxon automobile horn, the firing of a 38-caliber revolver, the setting off of a photographic flash, and the pulling of a resin-treated cloth over a string attached to the bottom of a four-inch tin can. Motion-picture films depicting bathing beauties, news features, various dramatic situations, and 'clippings' which had been removed from current films under censorship were used.

Gaskill found an individual variability in responses among the thirty observers used in his main experiments—a variability which increased under emotional stimulation. Intense fear gave considerable increase in the number and in the duration of rises and drops in blood-pressure but no pronounced changes in heart rate. Increases in heart rate were much more consistently revealed in disgust and sex. Fear and shock also gave large increases in the variability of respiration; the I/E ratio also increased, but more markedly in subtle sex stimulation. The amplitudes of respiration (volume) were greatest for fear and shock, less large for disgust and sex; both of these were far above normal.

In connection with our recent discussion of involuntary movement, however, Gaskill obtained only negative results concerning the twofold category of pursuit and avoidance. While it was true that there were greater individual differences manifested in involuntary movements than in the case of any other classes of response and that the lateral movements in all instances were more numerous, more variable, and greater in extent than the longitudinal ones, no definite trend in direction, *i.e.*, inward or outward, was noted. The calculation of salivary p_H also showed great variability but a consistent and large drop for fear and shock. Similar but less extensive drops in p_H were also recorded in connection with the showing of a film depicting excerpts from current pictures, including a long embrace.

Gaskill contends for the significance of patterns of physiological responses as a technique of the future which should prove fruitful. He therefore agrees with the general drift of our discussion. It can not be denied that there is a great variability of reaction among individuals, but that also from the welter of this response a consistent picture or pattern of response emerges within the frame of reference of introspectively reported emotions. What is much needed is a concentration of activity on a few typical emotions like *bona fide* fear, anger, hate, *etc.*, each one produced under laboratory conditions, each one carefully

analyzed introspectively, and each one recorded by means of multiple registering devices from the numerous sectors of bodily response. Some of the devices for recording physiological changes need to be further refined and then simplified before they can enter the picture. Especially worthy of detailed attention are the endocrine and other glands which have already been mentioned in passing. They will next engage us for the purpose of completing the somewhat varied program of the expressive technique.

But before passing to this section we must not forget to outline the approaches more recently made by Tiffin, Seashore, and others in the

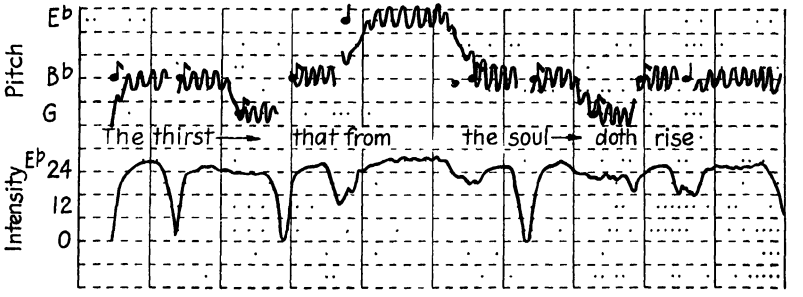


FIG. 42.—Tibbett's emotional singing of the fifth phrase from "Drink to Me Only with Thine Eyes." A strobophotographic record of the pitch variations and vibrato in the voice and an intensity record of fluctuations in both voice and accompaniment. Emotion is expressed in the variations of the vibrato as to rate and extent and in the variable duration. "From" is held much more than twice the value of "the." The flatting and sharping of tones and the transitions in the attacks, releases, and portamento of the tones are also objectively recorded. (*Victor recording* 12384. *Courtesy of Dr. Harold Seashore.*)

registration of the responses produced by the involuntary musculature of the voice as expression of emotion. Some of these effects are also, of course, voluntary in nature. Through the photographic recording of changes in pitch and in intensity of the voice, in its vibrato, and in its general pattern, the achievement of great artists in speech, in both dramatic and conversational performance, can be visualized and minutely analyzed. Here again separate emotional effects that are intended and the several emotions that are felt need to be more intensively studied. But a beginning in the right direction has been made, as is shown in the accompanying figures (Figs. 42, 43).

Another angle of investigation must also be mentioned in passing, namely the involuntary contractions of those lower portions of the digestive tract which are represented among the visceral sensations. There is considerable evidence in favor of the assumption that the digestive process is arrested during emotional excitement and that in extreme cases, on the other hand,

violent contractions of excretory systems may occur, leading to defecation and micturition. The latter types of reflex activity could hardly be induced under laboratory conditions because such violent emotional situations would probably not be attempted. Landis observed that no involuntary micturition took place in any of his subjects, although there were pronounced sweating and increased tendency toward nausea and gagging under some conditions, with a stomach balloon in place for some time. With this technique, however, he could not easily distinguish stomachic contractions *per se* from those induced through the diaphragmatic action of breathing. In some cases,



FIG 43.—Synchronized curves of pitch and intensity taken from the voice of a radio saleswoman, "Lady Esther." This record is taken from a speech recorded on an aluminum disk from a radio receiver and photographed by means of a moving beam of light from a phonelescope focused on a sensitive film. The analysis here shows considerable variation in both pitch and intensity during an effective emotional utterance. (*Reproduced from J. Tiffin, Applications of pitch and intensity measurements of connected speech, J. Acoust. Soc. of Amer.*, 5, 1934, *p* 229, *courtesy of Dr. Joseph Tiffin.*)

on the other hand, an independent periodicity took place.[1] Brunswick claimed that there was an absence or reduction of gastrointestinal activity in fear, envy, disappointment, irritation, pain, and unpleasantness while the muscular tonus increased in disgust, startle, and surprise.[2] In some of Landis's subjects the rectal activity was stopped during shock from electrical stimulation at another part of the body. Cannon and others have also reported cessation of peristaltic action of the stomach when observed with the aid of Röntgen rays in the case of cats, dogs, rabbits, and guinea pigs. Cannon even claimed that "very mild emotional disturbances are attended

[1] Studies in emotional reactions; *V*. Severe emotional upset, *J. Comp. Psychol.*, 6, 1926, pp. 221–242.

[2] D. Brunswick, The effects of emotional stimuli on the gastro-intestinal tone, *J. Comp. Psychol.*, 4, 1924, pp. 19–79, 225–287.

by abolition of peristalsis."[1] Of course, in these lower animal subjects the emotional upset was very likely of an extreme character. Whether extreme or not the point is that the digestive and excretory systems are likely to be affected to some degree in all emotional situations, as can be easily attested in the common experiences well known to us in everyday life. One need but to mention the digestive disruption caused by the excitement of hurrying to keep an appointment or the more wholesome assimilation of food when merriment as well as calories and vitamins attends the meal!

But the precise pattern or picture of response, so eagerly sought for by James in support of the varied applications of his theory, is still a matter of future research. The principle stares us in the face; its more refined formulation still has a doubtful look. For example, it is a well-known fact that one of the autacoids or chalones, adrenalin, whose secretion accompanies some of the major emotional disturbances like fear, anger, and rage, has the power to inhibit the muscular coat of the intestines. And again we may be confronted with a problem of individual differences because, as the writer means to point out in a later chapter, competently trained observers often fail to mention the presence of organic sensations even with the experience of intensely violent emotional situations. It might be argued, too, that although these abdominal responses occur, such individuals may be abdominally insensitive or anaesthetic. Our data on this phase of the problem are also rather meager and no intensive investigations have been reported. The matter is of prime moment, however, because the sympathetic nervous system has access to these physiological functions and their reactions may conceivably play a major part in the genetic distinctions between the various classes of emotion.

12. The Responses of the Endocrine and Other Glands.—The action of the sympathetic branch of the autonomic nervous system has already been casually referred to. It is this system, together with its antagonistically correlated branch, the parasympathetic or craniosacral system, to which we must look for the primary connections to the glands and other responsive mechanisms in the interior, and to some extent on the exterior of our bodies as related to emotional behavior.

Kling,[2] following Kuntz,[3] has pointed out that, instead of being related merely by way of antagonism to the sympathetic system, the parasympathetic branch may even be more active in the emotional life than the sympathetic

[1] W. B. Cannon, *Bodily Changes in Pain, Hunger, Fear, and Rage*, 2d ed., pp. 12–16, 1929.

[2] C. Kling, The rôle of the parasympathetics in emotion, *Psychol. Rev.*, 40, 1933, pp. 368–380.

[3] A. Kuntz, *The Autonomic Nervous System*, p. 439, 1929.

system. Allport has been mentioned before (p. 179) as supporting the theory that the parasympathetic system, when it dominates the sympathetic, is correlated with the pleasant affective qualities. But Kling held that many of the unpleasant emotional syndromes, like those of fear and fright, assigned by Cannon to the sympathetic system, show at least a partial relationship to the parasympathetic system. Specifically he mentioned the vagotonic inhibition of the heart, the fall of blood-pressure and syncope especially in the supply to the brain, spastic contractions of the esophagus as in the report of 'lump in the throat,' 'heart sticking in throat,' *etc.*, the sudden redistribution of blood supply to sexual organs, but also to intestines, and the dilation of the sphincter muscles of the bladder and rectum—all these show the preponderant influence of the parasympathetic system and all of them in connection with emotional states like those of fear and fright. This is further evidence that when we begin to abstract too greatly and to seek responsibility for bodily responses in only one system, we inevitably run into the intricate pattern of response referred to. While we are impressed with this complicated mechanism, we shall gradually emerge with a picture in which we shall be able to tell which neural system is predominantly effective in producing certain results. In other words, on the bodily side emotions are as complicated as they are complex introspectively on the mental side.

Of course the autonomic nervous system is not truly autonomous or independent: that can be said more truly of local plexuses which lie within the walls of the heart and alimentary tract and which appear to actuate the periodic contractions of the viscera. The autonomic system is intimately connected with the central nervous system and it is internally integrated, on the other hand, especially in its sympathetic branch, through a series of plexuses just outside the spinal column and in regional ganglionic plexuses elsewhere. And yet it may be cited as an illustration on the physiological level of the gradual differentiation of systems from whole to part. On this basis the most differentiated portions of the system are the truly autonomic plexuses in the heart and other viscera, whereas the less individuated parts are the autonomic system and, least of all, the central nervous system. Due to the genetic precedence of the affective life we may expect to find on the bodily side a correlation of these simple affective qualities with the remnants of that portion of the nervous system, still to be found in jellyfishes and the lowest worms,[1] which was at first universal and which is now to be found in the viscera of our most complicated bodies. Emotions, which represent, as we have been shown in previous chapters, a higher form of mental life when percepts first became possible, require a more particular form of semidifferentiation, analogous to the autonomic nervous system as Lickley has indicated.[2] Finally when voluntary control of emotions became necessary and the higher forms of the mental life on the level of concepts came into the picture, the central nervous system became enrolled.

[1] C. J. Herrick, *An Introduction to Neurology*, p. 53, 1916.

[2] J. D. Lickley, *The Nervous System*, 2d ed., p. 34, 1931.

From the point of view of emotions it is very important, then, that we now go into the matter of the internal mechanism of the autonomic nervous system and its special control over the secretions of various glands, whose products so vastly affect the entire bodily function. Naturally as Lickley, a well-known anatomist, had the foresight to point out[1] in a phrase which bears repetition, "Emotions may influence greatly the movements and secretions of the viscera, *etc.*, while, on the other hand, abnormal conditions in the viscera may produce marked emotional changes." The wheel turns both ways. The intricate system of checks and balances in the autonomic nervous system, as regards its principal branches, can better be understood if we study for a moment some of the more pronounced controls as tabulated below.

AUTONOMIC EFFERENT CONNECTIONS[1]

Sympathetic supply only: sweat glands, hair erector muscles (erector pili), sebaceous glands

	Contraction or increase of function	Release or decrease of function
Iris	3d cranial	Sympathetic
Lacrimal glands	7th cranial	Sympathetic
Salivary glands	5th, 7th, and 9th cranial	Sympathetic
Heart and viscera	10th cranial	Sympathetic
Liver and bile	10th cranial	Sympathetic
Glycogen	10th cranial	Sympathetic
Stomach	10th cranial	Sympathetic
Ascending colon	10th cranial	Sympathetic
Ileocaecal valve	Sympathetic	10th cranial
Uterine musculature	Sympathetic	Parasympathetic
Internal sphincters, bladder	Sympathetic	Parasympathetic
Lower large intestine and rectum	Parasympathetic	Sympathetic
Bladder musculature	Parasympathetic	Sympathetic
Kidney secretion	Parasympathetic	Sympathetic
Genital glands	Parasympathetic	Sympathetic
Adrenal glands	Parasympathetic	Sympathetic
Blood vessels (vasomotor)	Parasympathetic	Sympathetic

[1] For a more detailed account see P. Bard, Emotion: I. the neuro-humoral basis of emotional reactions, Chap. VI of C. Murchison, *Handbook of General Experimental Psychology*, pp 264 311, 1934.

While we are concerned chiefly (1) with the influence of emotional experiences on endocrine activities and, (2) with the influence of the endocrines in stimulating emotional experiences, we must not lose sight of the widespread interconnections of the autonomic nervous system in terms, (*a*) of glands like the lacrimal, salivary, sebaceous,

[1] *Ibid.*, p. 34.

and sweat glands and, (*b*) of the visceral organs themselves, like the heart, lungs, stomach, intestines, kidney, bladder, *etc.* For the frame within which our phenomena now take place is one of far-flung complexity and integration. Just as the emotion is the first mental experience of the affective type that can comprehend cognitively an object, event, or situation with ever widening margins of relationships and meanings, prospective as well as retrospective, so on the bodily side we need for the first time a mechanism whose response is also far-flung and well organized. We shall see that in several instances, as, for example, with the liberation of glycogen, such a broad influence is immediately made possible.

The endocrine glands that have received the most attention in the experimental literature are the adrenal glands, situated on the upper and front portion of each kidney. They are about 1¼ to 2 inches long. Each one consists of an outer rind or cortex, which liberates cortin, and an inner medulla, which secretes epinephrine. The mechanism of the latter has been much better investigated than that of the former. It has been prepared as an extract and as a synthetic chemical product. It is also known as adrenalin, adrenin, suprarenalin, and suprarenin. Cortin is also available as an extract. Both are effective in very minute quantities, the tested amount of epinephrine secreted being in the neighborhood of .0002 mgm. per kgm. of body weight per minute.

Cannon and others have demonstrated that blood from excited cats when barked at by a dog caused relaxation of the intestinal strip, due to adrenal secretion. Also when the heart was completely denervated from the central nervous system and its rate could then be influenced only by the adrenal content of the blood, a cat with adrenals intact showed an increase in heart rate from 217 in the tranquil state to 255 in the excited condition. That the splanchnic division of the parasympathetic system may itself cause a change in the secretion of adrenalin has been demonstrated by Tournade and Chabrol.[1] But mere stimulation of the splanchnic nerve without the action of the suprarenals will not cause an increased production of glycogen or the condition known as glycosuria. Many observations confirm the inference that glycosuria may be induced through an increase in the secretion of adrenalin as the result of emotional disturbance. This condition is commonly known as 'emotional glycosuria' and holds for human as well as lower animal subjects. It should be noted, however, that depressing as well as exciting situations lead to the presence of sugar (glycogen) in the blood (glycemia) and that no differentiation of

[1] A. Tournade and M. Chabrol, Le procès de l'adrenalinémie physiologique; le pour et le contre, *C. r. Soc. de Biol.*, 86, 1922, pp. 776–778.

any significance between various kinds of emotional disturbances has been made in terms of the glycogen content of either blood or urine. Reliable data indicate that an increase in the amount of adrenalin in the blood stream, either through natural internal secretion or through artificial administration, leads to the following results:

1. Increase in the liberation of glycogen from the liver, which furnishes an additional supply of food for the muscles and other tissues.
2. Increase in the tremor and tonicity of voluntary muscles producing a condition conducive to release of greater muscular energy and to the temporary counteraction of symptoms of fatigue.
3. Directly decreases fatigue in voluntary muscles through effects on the neuromuscular junction at the end-plate of the motor nerves.
4. Produces inhibition or relaxation of smooth muscles, especially in the intestines and other visceral organs, thus disturbing peristaltic action and retarding digestive and reproductive functions that are not immediately needed.
5. Changes the volumetric distribution of the blood through the body by affecting the sympathetic branch of the autonomic system, thus supplying blood presumably where it is temporarily most needed, *i.e.*, away from the interior and toward the periphery of the body.
6. Increases blood-pressure through direct effect on the cardiac muscle and on the vasomotor mechanism of the arteries, thus increasing the supply of food and washing out the waste products due to increased metabolism.
7. Relaxes the bronchioles, apparently affording a greater supply of air for oxidation of the waste products of combustion.
8. Hastens the coagulation or clotting of the blood, presumably to stanch the flow when hemorrhages take place through injury.

While these effects have been rather definitely stated, it remains to be said that the mechanisms involved have not been unequivocally determined. Stewart and Rogoff challenge some of the assertions made by Cannon, some of his coworkers, and still others not directly connected with the Harvard Medical School.[1] Stewart's interpretation is sometimes referred to as the 'existence theory' in contrast to Cannon's 'emergency theory.' Stewart and Rogoff point out the extremely careful technique required to obtain dependable results and

[1] *V.* G. N. Stewart and J. M. Rogoff, The output of epinephrine in shock, *Amer. J. Physiol.*, 48, 1919, pp. 22–44. Cannon's conclusions are summarized in W. B. Cannon, Neural organization for emotional expression, Chap. XXII, in *Feelings and Emotions, The Wittenberg Symposium*, 1928; in his book, *Bodily Changes in Pain, Hunger, Fear, and Rage*, 2d ed., 1929; in P. Bard, *op. cit.*, pp. 264–311; and very briefly in C. Landis, Emotion: II. The expressions of emotion, Chap. VII, *ibid.* An adequate summary of most of the significant work done before 1925 appears in J. Rikimaru, Emotion and endocrine activities, *Psychol. Bull.*, 22, 1925, pp. 205–258.

criticize some of the other data which conflict with their own as being due to faulty experimentation. The rate of liberation of epinephrine in dogs and cats, and also in the case of a baboon, after the blood-pressure had been permanently lowered by exposure and manipulation of the intestines, by partial occlusion of the inferior vena cava, by excessive hemorrhage, and by peptone injection, was found to be identical with that found before the blood-pressure was thus lowered. Strychnine, however, produced a marked increase in the secretion of epinephrine. The stimulation of the peripheral end of the splanchnic branch of the parasympathetic system also produced this result. They therefore refuse to believe that emotional hyperglycemia is related to the secretion of epinephrine from the suprarenals. What the mechanism is, is left in doubt. Many other workers have found that, for example, if the adrenals are removed, emotional stimulation will not cause an increase in the glycogen content of the blood. In the minds of most authorities, including Cannon, of course, these glands apparently are then essential agencies for many of the complex phenomena accompanying emotional experiences.

While adrenalin, or more recently called 'epinephrine,' still is considered on the whole as having a stimulating effect on the terminal sympathetic structures, thus, for example, resulting in increased blood-pressure, not all authorities are agreed that it always operates in this manner. We have already referred to the Cannon-Stewart controversy. Hoskins and Timme have stated that particularly in anaesthetized subjects, but also in some 1,500 normal unanaesthetized recruits during the World War, small doses of epinephrine, intramuscularly injected, produced in a huge majority of cases a definitely depressing effect, especially in decreasing the blood pressure. Investigators in this field are therefore impressed with the complexity of the problem and the need for more carefully controlled research with dependable extracts, more particularly from the anterior lobe of the pituitary.[1]

From a recent experiment by Cantril, using twelve observers, it appears that conclusions concerning the adrenalin syndrome have hitherto been too broadly made. Most of the work had previously centered about fear, rage, pain, and hunger. Through careful introspective analyses including a number of emotional situations, Cantril concluded that, even with a 1.5 cc. injection of a $1/1000$ solution of adrenalin chloride, disgust did not give the pattern of bodily reactions characteristic of the adrenalin syndrome, but fear did give such a pattern. But what is more important, we find confirmation of a

[1] *The Vegetative Nervous System* (Proc. of the Assn. for Research in Nervous and Mental Disease, 1928), 1930, pp. 352–365.

previously indicated fact that the sensory concomitants of the emotional experience, such as would be induced by the autonomic nervous system and its manifold bodily effects, are really secondary to the experience taken as a whole, which centers about the cognitive awareness of some object or situation. The qualitative nature of the emotion is much more dependent upon the attitude aroused in the observer than by any bodily syndrome.[1]

Cantril's experiments go one step farther than those reported earlier in the literature. Most of Marañon's subjects, when treated with an injection of adrenalin, reported either 'cold' emotions, with only bodily symptoms present, or 'as if' emotions, which were merely associatively connected with similar experiences in the past. A few reported genuinely experienced emotions. Cantril and Hunt[2] and Landis and Hunt[3] repeated these conditions, the first with normal subjects and the second with clinical patients. Their techniques were much the same. The former experimenters only rarely found a true emotion in the normal subjects who had received an intramuscular injection of adrenalin. In general only a 'cold' emotion was aroused. Besides the primary autonomic reactions and possibly some secondary behavioral response patterns which were both of the inherited and the learned type due to reactions of the cerebrospinal nervous system, they believe that the usual emotional state involves also a cognitive attitude toward some object or situation. Although using a somewhat different terminology, the latter experimenters came practically to the same conclusions. As a rule, the injection of adrenalin in sufficient amounts produced the organic reactions usually characterized by workers in the field of animal psychology and by behaviorists in general as emotion. Only in a few cases was the complete emotional experience present, but the investigators were obviously handicapped by their inability to obtain analytical reports of mental processes from these clinical patients. In short, we are back to the old problem first faced in the discussion of the James-Lange theory and again in the Cannon-Wheeler controversy. More and more do at least the more critical experimenters realize that emotional responses are not equivalent to emotional experiences and also that, while fear or general excitement may be emotional, *all* emotions are not limited to the response pattern of fear

[1] H. Cantril, The rôles of the situation and adrenalin in the induction of emotion, *Amer. J. Psychol.*, 46, 1934, pp. 568–579.

[2] H. Cantril and W. A. Hunt, Emotional effects produced by the injection of adrenalin, *Amer. J. Psychol.*, 44, 1932, pp. 300–307.

[3] C. Landis and W. A. Hunt, Adrenalin and emotion, *Psychol. Rev*, 39, 1932, pp. 467–485.

or general excitement. In all cases the cognitive, perceptual, or intellectual element again looms large and only a dent has been made on the problem of differentiating the different kinds of emotion in terms of bodily response.

If we now pass to some of the other endocrine reactions, we find that our scientific information is much more scanty and the evidence is largely based on inferences from clinical materials. The thyroid gland, called by Crile "the organ of the emotions," and by others "the gland of the emotions," is situated about the upper trachea just below the larynx. Its chief function is to regulate the normal metabolic rate: too abundant secretion of its essential product, thyroxin, or hyperthyroidism, results in toxic goiter with rapid heart action and an instable nervous condition; subnormal secretion produces retarded mental and physical development such as in cretinism and myxoedema. The emotional life in clinical patients of both classes is markedly different. In the former group we find emotional irritability and excessive responses; in the latter group, stolidity, sluggishness of response, and a generally depressed condition obtains. The exact mechanism, however, is not well known, nor has an absolutely satisfactory test for the presence of thyroxin in the blood been devised, although a chemical equivalent has been synthesized.

The pituitary body, sometimes called the hypophysis, is also a paired lobular gland of internal secretion and is located at the base of the brain. Two secretions are known, tethelin, liberated from the anterior lobe, and pituitrin, liberated from the posterior lobe and probably from the pars intermedia, but neither one has been chemically prepared. There is some question whether tethelin deserves a separate name, since its specific action is not clearly indicated. Even pituitrin is considered as a mixture of mutually interacting substances. Recent studies have shown that the anterior lobe produces at least two classes of hormones; the absence of one of these (prolan A) results in dwarfism while its excessive production leads to giantism and acromegaly characterized by marked enlargement of the bones of the face, hands, and feet. There is some reason for believing that tethelin has an indirect action also on the development of sexual emotions and, when excessive in amount, in the premature development of the sex organs. Precise knowledge of the various mechanisms is wanting, however, and the exact relation of the pituitary gland to emotion is not known. Pituitrin in many instances seems to have the same effects as adrenalin, which fact complicates the techniques used to differentiate their respective functions.

When we come to the function of the gonads, we can state the present situation only in general terms as applied to emotion. When castration of the male is performed early in life, all or almost all the male secondary characteristics, mental as well as physical, fail to appear. Antlers in the stag and spurs and comb of the cock are wanting. In the female, however, if the ovary has been spayed, not only will the female secondary characteristics be lost but the secondary male characteristics will appear. Naturally most of the

actual investigations have been made on the lower animals. Some results have been noted on human clinical patients, but no laboratory research has been reported that would require long discussion here.

There are naturally many other glandular reactions that are commonly known, but they have not been intensively studied. Some of these reactions have only an indirect connection with the affective life and function largely as direct aids in other physiological processes. We know, for example, that the primary function of the tear or the lacrimal glands is to keep the eyes moist or under unusual circumstances to wash out foreign objects or chemical substances that might be caught under the eyelids. In spite of the allusion to 'crocodile tears,' the statement has been made, and to the writer's knowledge has not been contradicted, that only human subjects weep. Children are said not to be able to weep until after the first few weeks of life. Lund claimed that weeping results from pleasant stimuli, or at least from an alleviating cause, and is often found only in a socialized situation. Pathological subjects, he found, never weep while in a state of depression, but always during a mixed emotional state containing some elements of euphoria. Under these affective conditions the lacrimal reflex occurs only as some pleasant or satisfying element is introduced into the experience. He believed that self-pity is the essential ingredient and that in adults considerable satisfaction comes from the relief afforded after tension.[1]

If we must seek causes, one writer's guess may be as good as another's except for the fact that Lund has given the matter considerable thought based upon certain rather limited observations. No intensive scientific research has been reported, however, and the question of theoretical interpretations must await the gathering of further data. Originally the lacrimal reflex undoubtedly exercised a purely physiological function: that of irrigating both the optical orbits and the nasal passage through which the overflow drains. The mechanical, chemical, or thermal irritation of the eyeball and eyelids as well as the mucous membranes of the nose is an adequate stimulation for this reflex. Infrared or ultraviolet rays impinging on the retina are also held to be in this class. Violent laughing, crying, coughing, retching, sneezing, yawning, and gasping are usually accompanied by weeping. Pain sensations in near-by portions of the face and nose, mediated by the Vth cranial nerve, will also tend to arouse weeping. In addition weeping may occur with general nervousness and irritability as well as in sorrow and joy. In relatively few individuals is it under voluntary control. For the sake of the simplicity of the argument, it

[1] *Op. cit.*, Chap. VI; Why do we weep, *J. Soc. Psychol.*, 7, 1930, pp. 136–151.

is probably safer but less interesting to say that the function of this gland is similar to that of many others on the periphery of the body that are connected with the autonomic system. A larger amount of irrigation is probably in order when the eyeball is in excessive use under the conditions of biological emergency. It is therefore difficult to attach the motive of self-pity when control toward release of tears is possessed by so few individuals. The conditioning in the direction of inhibition or prevention of weeping is probably gradually acquired involuntarily by many individuals through what may be termed emotional 'hardening' or adaptation to environmental situations. But the voluntary production of tears could not be directly so learned. Indirectly a certain subconsciously expressive effect might be involved as in fainting and in other phenomena of hysteria: aid and comfort by way of consolation or other social responses on the part of spectators may then result. But the motive in any case must underlie the general level of consciousness itself and be referable to strata of neural tendency which the pathologist has subsumed. At any rate more factual investigations are needed on this subject than are now available to warrant anything more than a floating hypothesis verging on speculation.

The salivary gland has been prominent in the literature of reflexology especially since the 'Pavlov dog' was born into the scientific world. While the process of salivation has thus been so thoroughly discussed in connection with the sense-feeling of hunger and while the investigations which have been centered around the efforts to condition this reflex to a number of other than the normal stimuli have led to an intricate maze of research along similar lines, relatively little has been accomplished in the direction of measuring the reaction as a means of differentiating the feelings and emotions. Moist and dry lips, mouth, and throat figure frequently in introspective analyses. But the writer is not aware of any thoroughgoing investigation which employed a scientific technique on this portion of the anatomy that is so directly accessible. Undoubtedly many such gaps in our scientific approach to the effective life will be partially filled within the next decade. Of course, we must not forget the electrochemical analyses which have been made in connection with the p_H value of the saliva, but that is mainly in the direction of a check on the basal metabolic rate. Just as it is usually possible, moreover, to produce a salivary reflex in the classroom or in the home through the mere mention of "luscious apple pie with a rich brown crust and an inviting portion of ice cream spread over the top," so it would be interesting to get quantitative results of the salivary reflex from verbally suggested and conceptualized emotional situations.

The sweat glands have already been incidentally mentioned and will be treated more extensively in the succeeding chapter. Obviously the technique here must be minute in detail and has not yet gone far enough to validate any general conclusion with respect to the differentiae of the various feelings and emotions. It is fairly well established that these glands are intimately related to the autonomic system without mediation from the central nervous system. This is equally true of the hair-erector muscles (*erector pili*) and of the sebaceous glands. The latter may be genetically allied to specialized glands, like the glands of the skunk and civet cat, which probably are entirely weapons of defense. Related, too, are the odoriferous glands of the male and female genital organs. We must also recall here that in many of the lower forms of animals odors are much more significant in the mental life if we consider not only direct experimental evidence but the great prominence of the olfactory lobes in the brains of these animals. The *erector pili* are involved in the common reaction known as 'goose flesh' since they cause the hair-follicle to become slightly raised, especially in those portions of the skin which have relatively short hairs which are frequently very light in color. Genetically they are related to the 'bristling' hair, quills, and feathers found in many of the lower animals which either thus offer sharp weapons of defense or thereby produce a suddenly enlarged appearance of the body which, through its contrasting visual effect on the victim, may provide a means of cataplectic control analogous to a startle or physical surprise not far removed from shock and consequent maladjustment on the part of the aggressor to a new situation. We ought not to omit other possibilities that muscular action near the surface is correlated with greater flow of blood to the periphery by way of exercise to offset cold and *in toto* leads to, or is an evidence of, increased metabolism. Also a mouthful of feathers to the hawk or eagle might very likely be as objectionable as a noseful of odor to the dog or wolf.

There are other glandular reactions besides those mentioned which are very likely influenced by affective situations: the flow of gastric juice in the stomach, the secretions of the pancreas, and the like. Cannon discussed the 'turgescence' theory of the gastric glands as advanced by Beaumont and Luciani but rejected it in favor of the theory that contractions of the muscular wall of the stomach are in the main responsible for the pangs of hunger. This theory was probably first proposed by Weber[1] in 1846 and has received almost continuous substantiation in experimental work as contrasted with the theory that hunger is primarily due to the hyperacidity of the stomach with the increased flow of hydrochloric acid of the gastric juice.[2] We are not ready to impute hunger to any single cause for the reason that the picture, as we have sketched it, is obviously neurologically complex.

[1] E. H. Weber, *Wagner's Handwörterbuch der Physiologie*, Vol. III, p. 580, 1846.

[2] W. B. Cannon, *Bodily Changes in Pain, Hunger, Fear, and Rage*, 2d ed., Chap. XV, 1929.

When experiments are made upon human subjects, we also run into a further confusion resulting from the ambiguous meaning of hunger, *i.e.*, whether we accept merely the bodily symptoms or expressions from the behavioral angle, or whether we shall include also the experiential components. The two attitudes or meanings do not necessarily conflict but usually the second provides a more complex setting similar to the situation which we have already discussed in connection with fear. In other words the cognitive element, correlated with cerebral functions, is a strong component in what we normally call 'hunger.' And yet the point here to be noticed is that the digestive functions, which are represented by gastric and other secretions, are profoundly influenced through the worry about the condition of the food prepared for a formal dinner, when the digestion of the hostess probably does not function properly, through the excitement of catching a train, when digestion and appetite are interfered with, or through the exhilaration of jolly conversation, when the meal is probably much better assimilated.

13. **Summary.**—We have gone in review through a maze of intricate problems, refined apparatus, and carefully controlled investigations. Glancing back, we have started out with the principle that the body in all its parts and functions has been considered a recording instrument which has afforded a picture of the affective life that is correlated with the mental experiences themselves. In a later chapter we have to deal more intimately with introspective techniques which analytically face the problem of experience itself. But already we have sounded this note repeatedly when we debated the issue of the cognitive processes in such emotions as fear, hunger, anger, and the like. Also, it is an old problem which confronted us as far back as the discussion of the James-Lange-Sergi theory.

More precisely we presented the procedure of expression as one of the two indirect channels of information concerning the affective life; the other channel has been called the procedure of impression and will be discussed in a later section of the book. The underlying principle of the procedure of expression is the widespread bodily effect which accompanies the affective life. An outline of some nine major subdivisions was presented to show the extensive array of minor techniques over a wide front of attack. We then discussed in some detail the various forms of apparatus which had been devised or adapted to record some of the bodily effects tabulated. Essential to many of the older techniques were the Marey tambour and the kymograph. More recent techniques used improved photographic equipment.

One after another many techniques were then described: measuring the circulatory and the respiratory processes, recording the move-

ments of the striped musculature, analyzing the basal metabolic rate (BMR), detecting glandular disturbances, and sectioning the various nervous systems. Next in order were the results obtained from many of these techniques under specially devised experimental situations. Some of the work had to do with the detection of the telling of the truth *vs.* lying. In much of this work we discovered a tendency to regard as applicable only those records which simultaneously showed in detail each one of the complex effects derived from a variety of bodily sources and over a considerable expanse of time in order to obtain a detectable 'pattern' of reaction. Often reliable data on the actual pleasant and unpleasant features of the experience were lacking. There can be no question about the bodily effects produced by emotional situations, but no accurate differentiae have been found to distinguish the various kinds of felt emotion. Even musical appreciation gives a definite picture of bodily reaction but also a varied effect from one individual to another.

There has been considerable discussion concerning the respiration ratio I/E first proposed by Benussi. In all these studies, as well as in those concerned with changes in circulation, the simpler affective processes produce much more uniform results in respect to pleasantness and unpleasantness from one individual to another. Blood volume, for example, increases fairly uniformly for pleasantness and much more uniformly decreases for unpleasantness. All suddenly appearing emotions seem to accelerate the heart beat momentarily with an accompanying increase in blood-pressure. Likewise sensory pleasantness is correlated usually with an increased frequency and diminished volume of breathing with a reversal of both these phenomena in the case of sensory unpleasantness. Klemm did not confirm the Benussi results because in the former's work in the courtroom the emotions to be tested were overlaid with equivocal emotional attitudes, making it necessary to take into account the total mental picture.

With the striped musculature we are involved in the older doctrine of the vestigial usefulness of movements of expression. As we have seen, the theory of pursuit and avoidance has been frequently mentioned. Extensor movements of the arm have frequently been found to be greater under pleasant circumstances than under unpleasant ones. There seems to be some ground for believing that unpleasant stimuli depress reflex movements. The involuntary movements toward and away from objects or stimuli that are either pleasant or unpleasant were investigated by Young and Corwin with the outcome that very unpleasant stimuli are quite likely to be accompanied by movements of withdrawal. The inhibition of the musculature of the digestive

tract may also directly result from the effects of adrenalin secreted under emotional excitement, so that when we come to the simplest mechanisms the real causal relation becomes complicated by that very fact.

We then moved into another realm, namely the endocrines, and found that at least hypothetically we have a further substantiation of our psychogenetic theory. The truly autonomic plexuses were correlated with the simple affective processes which are the vestiges of a more complete network on the neurological side, matched by a very extensive picture on the mental side, of a more primitive mind-body relationship. The effects of the various endocrine secretions, so far as known, were then briefly summarized. The adrenal glands were discussed most extensively and a list of eight effects of the secretion of adrenalin was presented.

A series of studies was then described in which the emotional effect of the administration of adrenalin was observed. The results seemed to be that at present we shall have to admit only approximately emotional effects with such substances, since in almost all cases the cognitive element of being afraid of something, let us say, could not be directly induced. Other glandular reactions, especially that of the thyroid gland, have been studied chiefly from their results in clinical practice. The immediate effects of thyroxin are complicated by the fact that they are somewhat similar to those of adrenalin. Pituitrin also has a marked effect on the smooth muscle tissue of the intestine not dissimilar to that of adrenalin. Undoubtedly there is an interaction between the various glandular secretions which under the usual experimental conditions of the psychological laboratory can not be separately investigated.

Briefly the action of other glands, like the tear glands, the salivary glands, the sweat glands, the sebaceous glands, and the glands of the digestive tract, was mentioned. But no direct experimental work has been done in this sector. Altogether we have discovered how widespread the entire pattern of glandular response is. The picture is tied up with the view of the whole bodily mechanism. Great progress has been made, especially in checking erroneous views. So far we have no one clear-cut series of bodily expression which reflects particular kinds of emotion. There is a tendency, however, (1) to obtain a large array of simultaneous reactions under a given type of stimulation, (2) to interpret bodily response more in terms of a long temporal pattern, and (3) to admit that pure bodily expression without the cognitive or 'intellectual' factor does not qualify as an equation for the experienced real emotion.

Review Questions

1. State the reasons for using preferably two *indirect* procedures of attack on the feelings and emotions.

2. What is the underlying principle in the procedure of expression? In the procedure of impression?

3. What two major influences stimulated the rapid rise of expressive procedures and techniques?

4. Name at least six major divisions of bodily approach.

5. Briefly describe some form of each of the following: *sphygmometer, pneumograph, ergograph, plethysmograph.*

6. State the evidence pointing to a change in the blood volume of the brain in connection with emotional stimuli.

7. Summarize the results which have been obtained in breathing and circulation with relatively simple affective stimuli.

8. Outline the present status of techniques which have investigated lying.

9. What is the general effect of pleasant stimuli in connection with extensor movements? Relate these results to the general theory of pursuit and avoidance.

10. Give a critical résumé of the work done in regard to 'cold' emotions

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CHAPTER XI

THE ELECTRODERMAL RESPONSE

In so far as the expression of emotion is organized and integrated through midbrain centers, these electrical responses may be regarded as one of the expressions of emotion. It is equally clear that every bodily activity or mental function other than emotion, which is integrated in these same midbrain areas, may and probably does give rise to these responses."

C. Landis, *Handbook of General Experimental Psychology.*

1. The Electrodermal Response as Emotional Expression.—In an age when electrical techniques have become prominent and the radio has helped to introduce refinements of circuits, amplifying devices, and scientific concepts in the electrical field, it is not at all strange that psychologists should follow physiologists, clinicians, and others in investigations which utilize these forms of apparatus and procedure in their quest for more reliable and perhaps more quantitatively conceived facts concerning mental phenomena. After it became known that the body also manifested certain small changes of an electrical nature, it was natural, too, to look to these more minute 'expressions' in connection with the affective life. The mechanical 'human cradle' has therefore yielded to the chemical test tube, which in turn has given way in many instances to the electrical deflection device. But the introductory quotation at the head of this chapter appropriately emphasizes the caution that we have already mentioned. When the early records of circulatory changes and respiratory variations were taken, it began to be obvious that the body resonated to effects other than those traceable to emotional responses. The more refined our technique becomes, the more easily will it pick up effects that may have been overlooked with coarser devices of detection. The increasing tendency, noted especially in the previous chapter, of considering the various mechanisms of the body in an integrative pattern, furthermore, makes the problem of the scientist, who wants to check each factor separately, all the more complicated and hazardous. But being forewarned is still being forearmed and the careful investigator not only tries therefore to control the situation as accurately as his problem warrants, but also reviews the literature with considerably more rigorous insight than was formerly possible.

Of course, in a certain sense we are still pioneering in a relatively unexplored territory. Whatever cues concerning the affective life we can pick up are at least indicative of what we should more analytically follow up. At any rate in the present stage of research we should be especially reserved about the conclusions which we draw from our experiments. In the last chapter a few fairly well-seasoned facts appeared to emerge. The sum total of such facts and the narrow scope of their applications are still proportionately small in relation to the amount of research that is under way. But progress has been reported. In a way we know what we do not know, which is always a healthy beginning.

Behind the picture of these electrical responses from the skin is the same autonomic nervous system whose manifold effects we traced in the last chapter. In this case, however, which speaks in favor of an advantage for electrical techniques, there is no direct complication with the central system. The sweat glands, to whose action electrical phenomena of the type that we are to discuss are primarily traced, are functionally related to the sympathetic division of the autonomic system without immediate intervention of the central nervous system. But again we must speak only in relative terms, for already there are reports of voluntary control of the electrodermal response and also reports of conditioning effects produced. Besides, that the electrodermal phenomena include effects which are not clearly mental and, within the mental, that there are effects which are not unequivocally affective, must also be said. Positively, nevertheless, we can see that the electrodermal system is exceedingly responsive to affective stimuli of many sorts. It is on this basis that we can therefore proceed with our discussion.

2. Historical Survey of the Electrodermal Response.—The history covering the discovery of electrical manifestations in living and especially in human organisms is as interesting as it is complex. It has been very adequately summarized by several competent authorities.[1] The present author has already published a brief survey of the field.[2] Electrical phenomena have been connected for more than a century with human and lower animal bodies. Before the actual proof that electrical phenomena existed, speculation was rife, especially when Mesmerism flourished near the close of the eighteenth century, con-

[1] C. Landis and H. N. DeWick, The electrical phenomena of the skin (psychogalvanic reflex), *Psychol. Bull.*, 26, 1929, pp. 64–119; C. Landis, Psychology and the psychogalvanic reflex, *Psychol. Rev.*, 37, 1930, pp. 381–398; C. Landis, Electrical phenomena of the skin (galvanic skin reflex), *Psychol. Bull.*, 29, 1932, pp. 693–752.

[2] W. S. Dysinger and C. A. Ruckmick, *op. cit.*, Chap. II.

cerning 'animal magnetism.' Probably the first discussion published on the subject was Bertholon's two-volume treatise, *The Electricity of the Human Body*, which appeared in 1786.

During the early part of the nineteenth century several writers directed scientific and medical attention to these phenomena. On the one hand we have the impetus given the investigation of the electrical properties of living tissue, especially in nerve and muscle preparations, by du Bois-Reymond in 1843, leading ultimately to the 'action currents' picked up in muscle and nerve fibers today.[1] At that time he had already distinguished between the so-called 'current of action' and the 'current of rest,' leading to one of the most heated controversies in the history of science.[2] But on the other hand, constantly refined techniques have also been developed since the early part of the nineteenth century to study more carefully the electrical changes in the skin of normal and abnormal subjects. Pétetin (1828) and Coudret (1834) did pioneering work in this field. This was continued by Meissner, who in 1861 gave a report on the electrical properties of the skin. In 1879 Vigouroux was attracted to the changes in electrical resistance manifested by the tissues of the body and attempted to explain these phenomena in terms of the vascular tonicity, the degree of sensitivity, the condition of liquidity, and the state of vitality of the tissues involved.[3] He also called attention to the variation in technique used and the effects of these on the results obtained. Stein in 1880 also made a study of the electrical potentials of the human body.

Thus far perhaps a major emphasis had been placed on the physiological and particularly on the therapeutic and abnormal side of the question. But soon the psychological significance became apparent, when Féré in 1888 pointed out the relation between affective and other mental processes and the variations in bodily resistance to an outside source of electrical energy.[4] This type of study continued until 1892, when he published his *Pathology of Emotions*. Since it utilized an outside source of electrical energy, the current has come to be known as 'exosomatic' in relation to the body or as the 'Féré phenomenon.' At about the same time, in 1888, Tarchanoff, a Russian physiologist, had discovered that the electrical potential from the body was also increased without any outside electromotive source

[1] E. du Bois-Reymond, *Untersuchungen uber thierische Elektricität*, 1848–1860.

[2] G. T. Ladd and R. S. Woodworth, *Elements of Physiological Psychology*, 2d ed, pp. 141 f., 1911.

[3] R. Vigouroux, Sur le rôle de la résistance électrique des tissus dans l'électrodiagnostic, *C. r. Soc. Biol.*, 31, 1879, pp. 336–339.

[4] C. Féré, Note sur des modifications de la tension électrique dans le corps humain, *C. r. Soc. Biol.*, 5, 1888, pp. 28–33.

having been introduced.[1] This occurred especially during mental excitement, but was explained in terms of a 'secretion theory' based upon the activity of the sweat glands. Consequently this current has been named 'endosomatic' in relation to the organism and the effect is often called the 'Tarchanoff phenomenon.' Tarchanoff did not confine his situations to affective stimuli, since he introduced auditory, olfactory, and gustatory perceptions, ideational processes, and motor performance. Nevertheless he did not rule out the possibility of affective coloring in many of these cases.

These electrical phenomena continued to interest chiefly the physiologists, neurologists, and psychiatrists. But in 1904 E. K. Müller, a Swiss electrical engineer, verified them and brought them to the notice of Veraguth, a psychiatrist and neurologist, who further pursued the problem and published some of his earlier results in 1906 and compiled them in book form in 1909.[2] Veraguth considered that the phenomenon was physiologically induced not by vascular changes in the skin but through the activity of the sweat glands and that the mental aspect involved either a feeling of reality or compulsion, or an emotional setting, or both. It is probable that the equivalent of the name, psychogalvanic reflex, was first coined by him in 1907. In the following years the studies drifted in the direction of abnormal cases, particularly in conjunction with the psychoanalytic school at Zurich, where Jung and Peterson used the technique diagnostically for the detection of emotional complexes.

3. The Present Interpretation of the Response.—Since then, the majority of psychologists have stressed the emotional, or at least the affective, aspect of the response and Piéron has gone so far as to declare that it is peculiar to emotional settings. With slight modifications in some cases we find a fairly general acceptance of the response as an indicator of affective processes in many textbooks of today. A few citations may illustrate the situation:

"If, now, the subject is given stimulation calculated to excite emotional reaction, the bodily resistance is found to decrease: the excursions of the galvanometer are greater, and it is assumed that the amount of increase measures the amount of the emotional excitement aroused. . . . The

[1] J. Tarchanoff, Über die galvanischen Erscheinungen an der Haut des Menschen bei Reizung der Sinnesorgane und bei verschiedenen Formen der psychischen Tätigkeit, *Pfluger's Arch. f. d. ges. Physiol.*, 46, 1890, pp. 46–55.

[2] E. K. Müller, Über Einfluss psychischer und physiologischer Vorgänge auf das elektrische Vermögen des Körpers, *Physik-Med. Monatschrift.*, 1, 1904–1905, pp. 212–214; O. Veraguth, Das psycho-galvanische Reflex-Phänomen, *Monat. f. Psychiat. u. Neur.*, 23, 1908, pp. 204–240.

galvanometric technique has been found particularly useful in determining the emotion-arousing values of different stimulus words given to the subject in the word-association test (*q.v., infra*); some having claimed that it is the most delicate index employed in that experiment. And in this connection there are those who have held that it is serviceable in bringing to light individual differences in emotional stability."[1]

"Much studied also has been the change in the electrical resistance of the skin that occurs during an affective state. A man has applied to his skin electrodes of a character to avoid themselves exciting electric currents by chemical reaction. A faint current is then introduced and measured by a galvanometer. It is found that if a pleasant or unpleasant stimulus is given to the man, the resistance of the skin is markedly decreased."[2]

"Nerve impulses are known to generate electricity, hence when the galvanometer is connected by wires with the human body it presumably responds to neural activity. It has been used successfully, however, only in the case of an emotional response. The resulting deflection of the light is called the *psychogalvanic reflex*."[3]

"Even in momentary thrills of fear, surprise, embarrassment or expectancy, the sweat glands are stimulated to a slight degree by their nerves, and the result is a momentary change in the electrical condition of the skin, which can be registered by a galvanometer and is called the *psychogalvanic reflex*. This electrical change is perhaps the most delicate indicator of emotion that the laboratory has yet produced."[4]

"The great majority of experimental subjects manifest these sudden and definite changes in skin resistance during emotion. Whether these changes are specific to emotion as such, or whether they are the expression of a stirred-up bodily state of which emotion is only one aspect, is a debated question, the answer to which is tied up with the problem of exact definition of what emotion is. It has been urged that striving or conation rather than emotion strictly speaking is the basis for the psychogalvanic reflex. It has also been argued that bodily upset, without any particular emotional or conative aspects, will produce the same results. However this may be, it remains true that for most persons in most reasonably well-controlled laboratory experiments emotions may be roughly 'measured' by this method."[5]

These quotations illustrate the position of most writers of textbooks who refer to the phenomenon at all. A few, like Dockeray, take a more cautious middle ground.

"Certain electrical changes have attracted considerable attention as possible delicate measures of emotional response when the overt behavior

[1] J. F. Dashiell, *Fundamentals of Objective Psychology*, pp. 220–221, 1928.

[2] W. B. Pillsbury, *The Fundamentals of Psychology*, 3d ed., p. 272, 1934.

[3] F. A. Perrin and D. B. Klein, *Psychology—Its Methods and Principles*, pp. 178–179, 1926.

[4] R. S. Woodworth, *Psychology*, 3d ed., p. 347, 1934.

[5] G. Murphy, *General Psychology*, pp. 100–102, 1933.

of the subject would not betray the presence of emotion. . . . The resistance offered at the contacts with the skin may vary as the result of changes in moisture of the skin, or there may be actual electrical currents produced by internal activities. . . . The variation in the resistance is the result of the reflex action of the sweat glands in the skin. The change in electric potential is probably the result of metabolic activities in nerve and muscle."

He points out further that the galvanometer readings may "vary considerably even though the subject remains apparently passive" and that any slight disturbance may affect the deflection. But he states also that when the subject responds with associated words that deal with maladjustments or worries, the deflections are more extensive.[1] Usually the closer we come to actual research workers in this field, the more uncertain do we become in the unequivocal interpretation of their results from the mental point of view. The picture presented is again a pattern of great complexity. If it were possible to hold all other factors constant, it might then be feasible to make a fairly clear case for the affective phenomena as correlates of this physiological response. The interpretation of the underlying physiological cause of the electrical phenomena must be left to physiologists and neurologists to work out. Accumulating evidence seems to be in favor of some polarization or capacitance effect in the cell tissues comprising the sweat glands, but vascular changes and action currents in the neuromuscular structures are not entirely ruled out. The literature on the subject is so comprehensive that a generalized statement on this point is hardly possible but the mass of opinion appears to be in the direction indicated. The innervation of these structures is traced principally if not exclusively to the autonomic nervous system.

When we reach the mental level itself, the task is further complicated by the fact that (1) the investigators in this field are of course not all equally qualified to make psychological distinctions and that (2) among the psychologists there is a painful lack of agreement as to what constitute affective or emotional phenomena from a systematic point of view. Landis here gives us as complete a survey of the situation as can anywhere be found[2]:

INVESTIGATORS	INTERPRETATION
40	Specific to or measure of *emotion*
10	Not necessarily *emotional* or *affective*
12	Identified with *conation, volition, attention*

[1] *Op. cit.*, pp. 213–214.

[2] C. Landis, Psychology and the psychogalvanic reflex, *Psychol. Rev.*, 37, 1930, pp. 381–398.

5	*Nonvoluntary*
21	One or another of the *higher mental processes*
8	Concomitant of all *sensations* or *perceptions*
5	Indicator of *conflict* and *suppression*
4	Index of *character, personality, temperament*

Obviously such a summary is very useful, but it may also be as misleading as its condensation is inadequate. The five investigators who are classified under the rubric of 'nonvoluntary,' for example, might still find a place under other rubrics as well, since most of us would agree to the nonvoluntary character of the response under the usual conditions. Again the emotions might involve *conative* factors and usually do; they may also be classed under the *higher mental processes*. But the general import of the table is clearly leaning toward the first category of emotional processes. With the reservations which we have made before, it is therefore quite in order to say that on the mental side there is fairly good evidence for the generalization that affective or emotional processes hold a major position among the others as correlates of the electrodermal response.

4. The Matter of Terminology.—With a gradual change in the electrical concepts it is not strange that suggestions have been made looking toward a better designation than the 'psychogalvanic reflex,' a term first used by Veraguth in 1907. As the author has said in a previous publication,[1] like the Holy Roman Empire which was not holy, not Roman, and not exactly an empire, so according to modern doctrines the response is not necessarily psychic, nor galvanic, nor a reflex. It has been argued that since the response can be elicited in a spinal preparation, the central reference of 'psycho' can be dispensed with. Lauer, Landis, and Bentley have also pointed out the inadequacies of a phrase which has become, nevertheless, very widely used.[2] Judging by titles of articles on the subject written in many languages, Lauer estimated that 15.7 per cent used this expression with no other as a close second. Considering content of articles as well as titles, Landis estimates the usage of this phrase as high as 26.8 per cent. The remainder show a wide scattering and a miscellaneous assortment of

[1] C. A. Ruckmick, Terminology *in re* 'psychogalvanic reflex,' *Psychol. Rev.*, 40, 1933, pp. 97–98.

[2] A. R. Lauer, Why not re-christen the 'psychogalvanic reflex'? *Psychol. Rev.*, 38, 1931, pp. 369–374; C. Landis, 'Psychogalvanic reflex' nomenclature, *Psychol. Rev.*, 39, 1932, pp. 184–188; M. Bentley, Report of Committee on the Problem of Mental Disorder, in *National Research Council Psychiatric Investigations*, 1934, p. 302. " 'Psycho' and 'reflex' are plain misnomers," says Bentley, "and 'galvanic' (like 'faradic') sounds both antiquated and incidental "

designations. The phrase has become abbreviated into the alphabetical symbol PGR.

Lauer suggested that a more accurate name be substituted and offered in its place the electro-bio-chemical response. That is, however, an awkward phrase and does not clearly differentiate it from other electrical responses, like the action current, from the body. More significantly Landis proposed a threefold set of expressions:

I. The electrical phenomena of the skin (to mean any electrical activity which is subject to measurement by an electrical instrument).
II. Galvanic skin response.
  1. The decreased apparent skin resistance due to physiological activity under control of the autonomous stimulation. (Féré phenomenon with exosomatic current.)
  2. The increased apparent electromotive force due to the same conditions set forth above. (Tarchanoff phenomenon with endosomatic current.)
III. Psychogalvanic reflex (the historical term used to designate II).

The present author, desiring to do away with the somewhat archaic term 'galvanic' and wishing further to simplify the expression, has proposed the phrase, the 'electrodermal response' (EDR). It is significant to note that all three proposals so far submitted have agreed to drop the misleading 'psycho' and the erroneous 'reflex.' It will not be easy to supplant a fairly well-grooved expression, especially as long as some of the work is still done with various types of instruments called galvanometers. In an increasing measure, however, other devices utilizing radio circuits and accessories are taking the place of galvanometers. We shall next have to discuss more intimately, therefore, some of the principal techniques which have become available.

5. Techniques and Methodology: Electrodes.—Obviously one of the chief problems, connected with electrical techniques dealing with the body, centers about the contacts that must necessarily be attached to the body in order to obtain a registration of the effects produced. The sources of error developed by the introduction of a foreign substance are among our chief difficulties in this situation, especially when we are dealing with very minute currents that are later to be amplified. There are in the main two sources of error to be reckoned with: (1) the effects of polarization and (2) battery effects. These two phenomena are electrically related but they operate to introduce extraneous electrical properties in addition to those which we wish to study. Both of them are more serious disturbances when *direct* exosomatic instead of

alternating currents are used. The first phenomenon refers to counteracting eddy currents which are set up around foreign substances and gases either accidentally present through impurities in the electrodes or due to electrolytic dissociation of the materials used. The second phenomenon appears because, together with the skin membrane, the metallic substance used in the electrode practically becomes a wet battery cell in itself, with the moisture present from sweating or from the liquid used in the electrode forming the electrolyte. This applies also to types of wet electrodes which are constituted of different metallic substances like mercury, mercurous chloride, and copper. These effects can probably never be entirely eliminated but they may be minimized, especially with the use of alternating current, which will periodically tend to cancel any accumulation of positive ions with the development of negative ions of approximately equal amount.

In addition to the electrical disturbances inherent in the electrodes, theoretically at least there may be polarization effects in the several layers of living tissue forming the true skin and the subcutaneous structures. Although the matter is not at all settled, the fact that generally in connection with the presentation of an affective or emotional situation there is a lag in the first appearance of the deflection in the electrical recording instrument of 3 to 7 seconds, called the 'period of latency,' and a duration of this effect for 3 to 15 seconds, usually on a decreasing scale, suggests that a capacitance like that of a condenser is being built up. Gildemeister and many others have suggested, however, that the apparent change in electrical resistance of the body between electrodes is actually a change in the amount or in the rate of polarization.[1] Jeffress also follows this argument. With both the endosomatic and the exosomatic types of current, he assumes a primary action current of the sweat glands, which in the latter case is directed inward from the surface of the skin resulting thus in a change of electrical polarization and a counter electromotive force that is manifest in the absence of any outside current.[2] But, in a way, the two concepts are not physically far removed from one another. In numerous papers Strohl and his colleagues have argued in favor of a combined resistive and capacitative effect which would also account for the polarization of ions within the permeable system of the skin.[3] The literature on the subject has become exceedingly large and complicated, but briefly stated, the tendency toward the acceptance of the notion that the various dermal and subcutaneous tissues behave somewhat after the fashion

[1] M. Gildemeister, Der galvanische Hautreflex als Teilerscheinung eines allgemeinen autonomen Reflexes, *Pfluger's Arch. f. d. ges. Physiol.*, 197, 1922–1923, pp. 432–436.

[2] L. A. Jeffress, Galvanic phenomena of the skin, *J. Exper. Psychol.*, 11, 1928, pp. 130–144.

[3] A. Strohl, Les schémas de conductibilité suivant la structure de la peau, *Bull. offic. Soc. fr. d'électrother.*, 38, 1930, pp. 329–330.

of a slightly leaky electric condenser is becoming more tenable. For a fuller discussion of this subject the reader is referred to Landis's competent summaries, already cited.

When we come to the electrodes themselves, we find that many devices have been proposed. Tarchanoff used nonpolarizable electrodes made of clay. Hypodermic needles made of platinum have been used by Sidis and Nelson and are still in use in connection with investigations concerning action currents. Zinc, zinc sulphate, nickel-plated brass, copper, kaolin, and zinc oxide have all been employed, either with or without a covering of chamois skin. The following prerequisites are essential:

1. The area of contact with the skin must be kept constant. Plainly any variation in area of contact will change the registration of the electrical output. This factor is, of course, correlated with the matter of pressure because if the pressure is not great enough to ensure proper surface contact the area will necessarily be reduced.

2. The area of contact must be large enough to avoid the possibility of an electric shock. Some individuals are exceedingly sensitive to minute electrical currents. If these currents are supplied at too great a density, we would also be faced with uncontrolled affective responses.

3. The pressure on the skin must be constant. Artificial resistances extraneous to the skin will be introduced when pressure is not sufficient to ensure maximal conductivity.

4. The pressure must not be excessive. Abnormal skin and subcutaneous effects will be introduced, to say nothing of uncontrolled affective responses, if the bandage or strap becomes uncomfortable.

5. The device must not be too cumbersome, awkward, or mentally impressive. Any device that is too complicated is not only apt to get out of order, but with some classes of subjects, like children or patients, the mere presence of an awe-inspiring electrode adds again an uncontrolled affective element.

6. The degree of moisture between the electrode and the skin must be kept constant. Darrow has clearly demonstrated that the electrodermal response is closely correlated with the amount of sweat released through the activity of the sweat glands. This points to the relation of the electrical response with the *activity* of the glands. Aside from that, which is, after all, what we are depending upon for an index to the affective response correlated with it, any variation in the degree of moisture would change the registration of the electrical properties to be measured.

7. The electrodes should not themselves generate any variable electrical properties, such as battery effects and polarization, which would interfere with the registration of such properties as are assignable to the body itself. This has already been discussed. When it is impossible to eliminate them completely, they should be minimized in effect.

If somehow coils of wire could be placed about particularly active portions of the body, so that induced currents could be set up either by the alternating type of action current or by sudden increases and decreases in electric potential or current magnitude, our problem of electrodes would be solved by elimination. New problems would doubtless arise, since the capacitative effect of the body would have to be kept constant by maintaining a uniform spatial relation to the coil and since the high degree of amplification would have to be carefully guarded against additional errors thus introduced. But with the rapid progress that is now being made in developing extremely sensitive electrical apparatus, it is not impossible to hope that electrical disturbances may be picked up from the human body that will be free of many of the errors just enumerated.

Perhaps a few instances of electrodes which are in use at present will suffice to illustrate the desirability of eliminating the errors above referred to. Lauer has described a very efficient form made essentially out of a Gooch funnel with most of the stem cut off and a platinum wire fused into the short remaining tube. The end of the cup-shaped portion of the funnel is covered with a soft rubber membrane through which the electrode proper is brought, in the form of either a spiral wire or a plate. The funnel is filled with a paste made of mercury, sodium, or zinc salts and the entire receptacle is fastened to the hand or other part of the body with a strap including an elastic band and a slip buckle.[1]

In the University of Iowa laboratory two types are employed. For direct currents with the Wechsler apparatus a simple form of liquid electrode has been devised. It has a disadvantage as compared with the Lauer electrode in that it can be used only with finger contacts. The electrical properties are such that it is relatively non-polarizable and that the battery effect is negligible.

Each one of two fingers is taped with adhesive tape at the central end of the first phalanx to ensure a uniform area of contact with the skin. The electrodes consist of a test-tube-shaped glass with a small tube fused at the bottom and bent back parallel to the larger portion. At the fused point a platinum wire makes the electrical connection between the two parts of the U tube. The wider tube contains redistilled mercury, mercurous chloride, and 1 per cent sodium chloride solution. The narrow tube contains mercury into which the amalgamated copper wire from the circuit is run. A wooden receptacle containing the two electrodes is clamped to the reading arm of a

[1] A. R. Lauer, A new type of electrode for the galvanic skin reflex, *J. Exper. Psychol.*, 11, 1928, pp. 248–251.

chair. More recently improvements have been made in the form of the glass tube, but the essential features remain the same.[1]

For alternating currents a bandage type of electrode has been in use for many years in the University of Iowa laboratory. This is an improvement over the type originally supplied with the Hathaway apparatus. The two copper end-plates are as large as they can be made for the average hand and are brought as close as possible without causing short-circuiting across the plates. A sponge-rubber pad together with a half-round piece of wood insures even and constant pressure. The leads from the electrodes are brought through the bandage, and removable clips, which are attached to the cord from the apparatus, complete the circuit. The bandage is made of belting material and is quickly and easily drawn tight by means of a slip buckle. It is worn without discomfort by the subject when he is not attached to the amplifying apparatus as well as when records are being taken. [2]

For the measurement of electrical potentials at various parts of the human body when great care needs to be exercised in obtaining relatively non-polarizable connections, special, but sometimes cumbersome, laboratory models of electrodes are resorted to. One of these types, called the Alvarez electrode,[3] has been simplified and somewhat guarded against breakage by having one arm of the electrode within the outer vessel instead of next to it.[4] Phares has similarly modified the original Ruckmick-Patterson electrode.[5]

Still another type of liquid, relatively non-polarizable electrode has been devised by Darrow. In this form care is exercised to keep the area of contact, the condition of moisture, and the applied pressure constant. It is adapted, however, only for contact with the hand, but it has the decided advantage of providing a nonirritant paste of saturated zinc sulphate kaolin on a zinc

[1] C. A. Ruckmick and E. Patterson, A simple non-polarizable electrode, *Amer. J. Psychol.*, 41, 1929, pp. 120–121. This electrode is manufactured by the C. H. Stoelting Co., 424 N. Homan Ave., Chicago, Ill. For a serviceable simple modification of this electrode see the description recently published by F. L. Dimmick and A. L. Adams, A simplification of the Ruckmick-Patterson non-polarizable electrode, *Amer. J. Psychol.*, 44, 1932, p. 800.

[2] This a further improved form of the electrode which is discussed in: C. A. Ruckmick, A new electrode for the Hathaway galvanic reflex apparatus, *Amer. J. Psychol.*, 42, 1930, pp. 106–107.

[3] W. C. Alvarez, B. L. Freedlander, and L. B. Clark, Electrode for measurements of skin potential, *J. Lab. & Clin. Med.*, 11, 1925, p. 83.

[4] T. W. Forbes, An improved electrode for the measurement of potentials on the human body, *J. Lab. & Clin. Med.*, 19, 1934, pp. 1234–1237.

[5] Listed as #24216 by the C. H. Stoelting Co., 424 N. Homan Ave., Chicago, Ill.

electrode with a protecting layer of absorbent cotton soaked in a physiological saline solution. Reservoirs beneath the hand, with attached wicks, keep the moisture content constant and a uniform pressure is maintained through a head of water determined by the height of a rubber bag raised above the subject's hand and applied through balloons to the backs of the electrodes.[1]

Something of the problem confronting the investigator in the field of the electrodermal response can be seen from the angle of carefully selected electrodes. Since, however, the incidental errors are minimized when alternating currents are used in the subject's circuit, this type of technique is strongly recommended. We shall have to discuss now some of the principal circuits that are available.

6. Techniques and Methodology: Apparatus and Circuits.—Next to the electrodes the most important adjunct is the instrument which registers the electrical changes. Since the current passed through the subject is in the neighborhood of .1 to .04 of a milliampere, this instrument must itself be very sensitive and a high order of amplification is required. Consequently some form of D'Arsonval or string galvanometer or allied electrical apparatus has been in use since the earliest investigations were made, although some experimenters have used the capillary and quadrant types of electrometer. When a milliammeter is used, the fundamental principle is practically the same as that of a D'Arsonval galvanometer. Frequently a Wheatstone bridge provides a means of simple amplification through the introduction of variable resistances, which are also used to balance the circuit and to bring the galvanometer to zero as a starting point for a given subject. A good example of this form of apparatus built to be portable and comparatively rugged is the Wechsler galvanometer. It contains a photographic arrangement so that deflections of the galvanometer can be recorded while it is visible to the experimenter. By attaching a metronome with electric contacts or some other timing device on the outside, the record can be made to show the temporal relations of the various entries. A signal mark, made by the experimenter at crucial moments, further establishes the record. In our own laboratory model we have added other features, such as an arrangement for mounting the cheaper photographic paper in place of film and a separate galvanometer for recording circulation and breathing. A much improved form permits the fairly complete development of photographic records within the apparatus, the addition of many other records in parallel courses on the paper, and other very desirable fea-

[1] C. W. Darrow, Relatively non-polarizing, constant moisture, constant pressure, constant area electrodes, *J. Gen. Psychol.*, 6, 1932, pp. 473–476.

tures. It has been referred to in the previous chapter under the name of the Behavior Research Photopolygraph.

More recently, with the improvement of oscillating circuits and with the great variety of vacuum tubes available, scores of new types of apparatus have come into use. These usually employ a number of oscillating tubes for the purpose of amplifying and rectifying the alternating current which is sent through the electrodes. Not much has been accomplished with the endosomatic technique, although theoretically the possibilities of avoiding some of the pitfalls of externally applied current could thus be avoided. Tarchanoff used a sensitive galvanometer but could not at that time steer clear of polarization effects produced by his type of electrode. Even the capillary electrometer which Radecki[1] substituted for the galvanometer did not, according to Broxton and Meunzinger, get away from probabilities of polarized effects attending a closed-circuit, low-resistance instrument.[2] They consequently used a quadrant electrometer which allows the circuit through the electrodes to remain open except when the instrument is receiving a charge. The quantity of current momentarily passed is much smaller than that used by other devices, but the instrument suffers the disadvantage of being extremely sensitive and consequently unstable and also of permitting only discrete readings, *i.e.*, no continuous records. If the endosomatic current were alternating in character it could be amplified through oscillating tubes and circuits. The electrical characteristics are such, however—at least from our present knowledge—that the endosomatic technique does not show much promise of being fruitful.

When the exosomatic type of circuit is used, the responses of the individual are measured in terms of deflections which indicate changes, usually decreases, in the subject's resistance to an outside source of current as found between the positions of the two electrodes on the body. These positions may be the palm and back of the hand, two near-by areas on the palm of the hand or the sole of the foot, or two finger tips. Other positions have also been tried. These changes are indicated visually in the swing or deflection of the galvanometer or in the movement of the hand on the dial of a milliammeter. A permanent record may also be made, as in the case of the Wechsler galvanometer or by the attachment devised by Grubbs and the author for the Hathaway apparatus (Fig. 44).[3]

[1] W. Radecki, Recherches expérimentales sur les phénomènes psycho-électriques, *Arch. de psychol.*, 11, 1911, pp. 209–293.

[2] J. W. Broxton and K. F. Meunzinger, Changes in skin potential during the psychogalvanic reflex, *J. Gen. Psychol.*, 5, 1931, pp. 94–98.

[3] S. W. Hathaway, A comparative study of psychogalvanic and association time

A great many different circuits have been proposed and tried out. When a galvanometer is used in most of the circuits, its sensitivity obviously changes in proportion to the amount of resistance introduced to 'balance' the subject's resistance and in relation to the varying resistance of the subject from time to time. This is true of such electrical circuits as the Hathaway apparatus involves. When a large amount of resistance is thrown into the circuit in series with the observer, the current through the observer can be kept much more constant from time to time, as Darrow has shown in his apparatus already referred to. The same result is achieved when current through the electrodes comes from the plate circuit of an oscillating tube. Godefroy used still another principle in that the circuit from the electrodes went through the primary coil of a 1:1 transformer from the secondary of which the galvanometer received an induced current whenever a change in potential occurred in the primary circuit. It has the disadvantage of giving the observer an electric shock likely to be felt if the changes occur too suddenly.[1] One of the most ingenious and at the same time one of the least expensive devices has been suggested by Howell.[2] A vacuum tube rectifies an alternating 60 $\sim$ supply current into a direct pulsating current, which is sent through the electrodes in series with a megohm resistance. A vacuum tube voltmeter is coupled across the electrodes to indicate the varying potential. The subject's resistance is calculated in terms of Ohm's law.

There are many other types of circuits which have appeared in recent years, but few of them have been used continuously enough to merit general acceptance. Recently Griffith and Wenger have developed a 'general purpose' circuit which lends itself for use under several different laboratory problems, especially in connection with young children and infants. It is essentially a modification of Davis' apparatus,[3] but with several other features added as alternative circuits. The Godefroy principle has been added and the device can also be used as a measuring instrument indicating changes in bodily potential, with a very small constant current of 2×10^{-8} amperes flowing through a resistance of 20,000 ohms in the subject's circuit. In the

measures: a new psychogalvanic apparatus, *J. Appl. Psychol.*, 13, 1929, pp. 632–646. The photographic attachment has not yet been described in the literature.

[1] J. C. L. Godefroy, The psycho-electro-tacho-gram and exophthalmic goiter, *Psychiat. en Neurol. Bladen*, 26, 1922, pp. 131–173.

[2] T. H. Howell, A new type of psychogalvanometer, *J. Exper. Psychol.*, 15, 1932, pp. 591–597.

[3] R. C. Davis, Factors affecting the galvanic reflex, *Arch. Psychol.*, 18, 1930, No. 115, pp. 1–64.

latter case the instrument functions as a millivoltmeter.[1] Greenwald has also invented a simple and serviceable apparatus; it is compact and contains a photographic unit so that a permanent record is available. Since the subject is connected in series with a large resistance together with additional voltage regulations, the current is fairly constantly maintained through the subject. The alternating supply current is thereafter rectified and passed through a sensitive galvanometer. The millimeter scale on which the deflections are projected is easily converted in ohms of resistance for each setting of the total amount of resistance put into the circuit.[2] Greenwald has made a further refinement of this circuit, necessitated by the use of a more sensitive galvanometer which allows a smaller current to pass through the subject's circuit. In this case very small changes in the voltage of the line A.C. current may disturb the balance of the instrument. The difficulty was overcome by placing a ninety-volt dry battery inside of the instrument and thus eliminating the rectifiers from the circuit.

Many of these newer forms of electrical circuit present theoretical advantages over instruments that have already been widely used. It is not safe, however, to state at present anything more than that constant improvements are being made, not only in the avoiding of errors which seem to vitiate the accuracy of the electrical determinations, but in the availability of newer electrical devices which tend to simplify the circuits and to stabilize them. A good example of the value of checking new apparatus in actual use is the critical work which Forbes has done on the Hathaway instrument.[3] In a rather exhaustive critical examination, he has pointed out that the size of the deflection in this apparatus was proportional neither to actual change in resistance nor to the percentage of change in resistance in the subject's circuit. The instrument, even according to Hathaway, is therefore not adapted to any research in which a quantitative measure of the electrodermal response is desired, but rather as a demonstrational model or in laboratory investigations in which the frequency of response is a sufficient criterion of emotional experience. The type of apparatus which Darrow has invented overcomes many of the difficulties which have been mentioned in that his resistance box with an automatically balanced bridge gives a high degree of sensitivity while the current through the subject's electrodes remains small and is practically uniformly constant. Continuous quantitative records are obtained

[1] P. E. Griffith and M. A. Wenger, A direct-coupled amplifier for the study of certain electrodermal phenomena, *Amer. J. Psychol.*, 47, 1935, pp. 678–681.

[2] D. U. Greenwald, New apparatus for the measurement of the electrodermal response, *Amer. J. Psychol.*, 47, 1935, pp. 682–685.

[3] T. W. Forbes, The Hathaway galvanic apparatus as an instrument of research, *Amer. J. Psychol.*, 45, 1933, pp. 502–521.

directly in standard units of measurement.[1] A pocket-size reflexohmeter has also been constructed and used by Darrow which follows the essential principles of the larger laboratory model. This apparatus has the added advantage of convenient portability. A uniform current of .0409 milliampere is sent through the subject's arm of the bridge and a resistance unit is placed in series with the subject to keep this current fairly constant. The instrument has a wide range of applica-

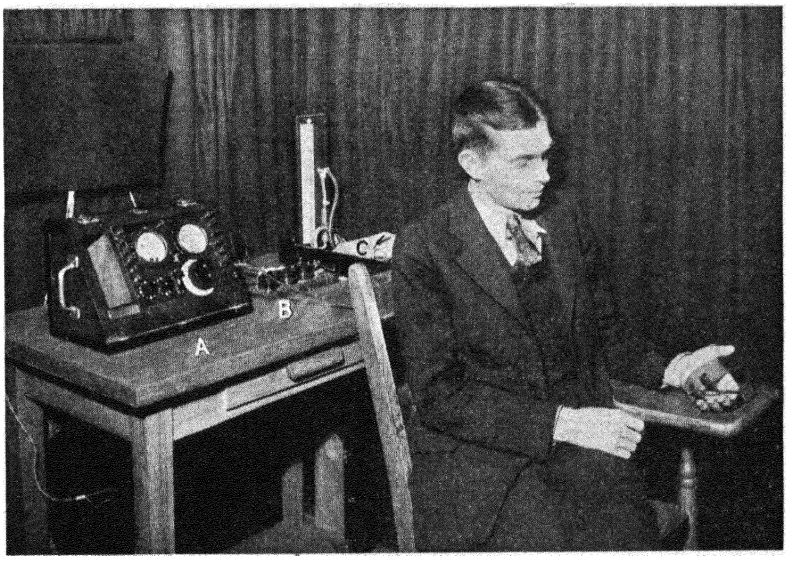


FIG. 44.—Observer connected through electrodes on palm of hand to Hathaway apparatus. The Hathaway apparatus *A* and blood-pressure apparatus *C* are seen in the background. This illustrates a method of recording the electrodermal response. In another room through the manipulation of switches seen at *B* a photographic recording device may be shunted in to produce records such as the one shown in photograph.

bility for rough determinations. The inventor suggests a number of situations which occur while driving an automobile or even while riding as a passenger that reveal some interesting ways of using the instrument.[2]

Without giving detailed information concerning the great variety of circuits and principles used in the detection and measurement of electrical phenomena directly and indirectly—sometimes even remotely—related to affective experiences in the individual, this hurried review must suffice to provide an indication of progress in this field of investi-

[1] C. W. Darrow, Uniform current for continuous, standard unit resistance records, *J. Gen. Psychol.*, 6, 1932, pp. 471–473.

[2] C. W. Darrow, The reflexohmeter (pocket type), *J. Gen. Psychol.*, 10, 1934, pp. 238–239.

gation. We should be ready now to see what these many approaches have yielded by way of experimental data. Some of the problems involve pathological interpretations but many point to normal mental occurrences of the emotional type.

7. Results Obtained by Means of the Electrodermal Response.— Omitting experiments which have gone into the matter of physiological causes of the electrodermal response, there has been a veritable flood of experimental and quasi-experimental articles which postulate and often expostulate that the response indicates a variety of mental processes. The most abundant claim seems to favor an affective experience of some sort as the correlate of the response.[1] The difficulty here is that well-controlled experiments with observers sufficiently trained in introspective analysis are woefully lacking. In part this deficiency is due to the unstabilized condition of our psychological terminology. When the term 'emotion' is used in so many contexts, it is not at all surprising that the interpretations of the results should take on so many different forms. Curiously enough many of the investigators argue on the basis of the situations which are set up to produce affective or emotional experiences, without resorting to the time-honored practice of training observers to analyze their experiences or even to make verbal comments of a 'prescientific' sort about them. No reliable or steadfast conclusion can follow from the experimental situation. In the realm of sensation or perception certain definite or fairly 'normal' experiences generally follow from the stimulus presented. With a high degree of conditioning or with vast individual differences in this degree of conditioning, no such expectation can legitimately be set up in every case. Besides, as we have learned from the discussions of bodily expressions, no safe guide is furnished us by an inspection of these processes. Only a reliable and well-trained observer can give us the right cue.

Again, different systems of psychology by way of indoctrination lead often to divergent results. For example, the conative or volitional aspects of the mental life have not been particularly stressed in American psychology. With the intentional omission of constructs related to the 'will' we have perhaps leaned over backward and avoided reference to any and all phenomena related to the 'will' of the older types of psychology. Following the well-known tradition, the British psychologists, and those trained by them, make frequent references to conative impulses. Conation has therefore found a place in the interpretation of the electrodermal response. On this side of the water, however, we have not been slow in discovering that the allied phenomena of action and motor response undoubtedly cause electrodermal

[1] C. Landis and W. A. Hunt, The conscious correlates of the galvanic skin response, *J. Exper. Psychol.*, 18, 1935, pp. 505–529.

responses and we have consequently been at pains to eliminate these factors as vitiating errors in the interpretation of results.

From our own work and from the investigations of many others it is possible to make a tentative general statement, therefore, that the electrodermal response, like most responses connected with the sympathetic division of the autonomic nervous system, is subject to the following classes of conditions: (1) primarily physiological changes and functional processes in the body, like changes in digestion, may affect the electrodermal response; (2) closely correlated with this possibility is the probability that widespread mental and bodily fatigue and depression as well as the opposite condition of euphoria, mental and bodily exhilaration, and alertness may account for many changes; (3) then, also intimately associated, states of attention, states of high and low degrees of mental concentration on and application to problems requiring various amounts of exertion and effort may cause changes in the electrodermal response; (4) not far removed, but often also entirely dissociated from these phenomena, electrodermal variations may occur with motor adjustments, with skilled and unskilled movements, with voluntary and involuntary reactions and, in short, with many mental phenomena called in British psychology, the orectic,[1] appetitive, and conative processes, or with what Aveling refers to as the dynamic aspect, "the 'set' of the conscious organism towards action," also with definitely volitional acts that are traditionally related to the Jamesonian 'fiat' of the self[2]; and (5) the electrodermal response apparently is influenced by the feelings and emotions and all other evolutionary gradations of the affective life.

Now it is obviously the goal of a program of research in this field to make some distinctions along the almost continuous line of these related phenomena. From our previous discussions, especially in our reaction to the tabular presentation on page 283, it should be clear that a vast amount of overlapping of these more or less artificially drawn categories can occur. In a full-fledged fear, for example, digestive disturbance, momentary depression and subsequent exhilaration, attentive change, overt movements, and affective coloring, all normally occur. Divergent experimental results and especially divergent interpretations occur when these various factors are not taken into account. Even well-guarded research may overlook the possibility that affective

[1] Orectic (from *orexis*, desire) seems to have been first proposed by Bartlett as representing a mixed mental state of feeling and striving. *V.* R. J. Bartlett, Does the psychogalvanic phenomenon indicate emotion?, *Brit. J. Psychol.*, 18, 1927, p. 49.

[2] *Op. cit.*, pp. 55 ff.; *V.* also The psychology of conation and volition, *Brit. J. Psychol.*, 16, 1926, pp. 339–353.

states differ widely in the relative amounts of these several factors as affecting the electrodermal response. But surely much is to be gained in the recognition of the complexity of the problem and in its frank envisagement from all angles. So far, for example, in our own recent work, general physiological conditions have been noted. But we need further objectively controlled records of the outstanding physiological conditions and their specific effect on the electrodermal response. Protracted and carefully controlled experiments have been under way in the psychological laboratory of the University of Iowa, for instance, on the effect of states of fatigue and euphoria on the electrodermal response. But much more work needs to be done and in other laboratories. Our recent studies have tried to cope with the problem of overt movement through the elimination of readings where overt movements were detected by the experimenter.[1] Lately a study has been completed which had as its central task the analysis of the electrodermal response from the angle of a number of different overt and imaged movements.[2] Using thirty-four observers with ten different types of movements including clearing of throat, sighing, moving of arm voluntarily and involuntarily, crossing of legs, dynamometric strength of gripping, and imaged brushing of hair from forehead, we have found definite evidence of galvanometric deflections which were quantitatively distinguishable.

A typical curve photographically obtained by Greenwald from the electrodermal response to a motion-picture narrative is shown in Fig. 45. At (22) the hero of the story is riding up to a cabin in which the outlaw, whom he intends to capture, is hidden behind a door. Both men are unarmed. The hero boldly enters and the outlaw jumps on his back (23). They fight for a few moments and then the hero is knocked to the floor. The outlaw climbs the stairs to the second story of the cabin and descends by means of an outside stairway to the ground (24). The hero recovers himself rapidly and crawls upstairs and out to the balcony, where he sees the outlaw riding at a gallop some distance away. He vaults the balcony rail and alights on his horse (25). The startled horse rears and turns around several times so that the hero manages him only with great difficulty. The outlaw then rides rapidly a great distance away (26). In the following short scene the sheriff prepares to leave town and come to the hero's aid. The hero rides his horse down a steep bank and thus gains on the outlaw. After a short race they are side by side. They start fighting, fall from their horses, and, clinched together, start rolling down a steep bank (28). Fighting all the time they slide from ledge to ledge (29). At the bottom they are still striking at each other

[1] W. S. Dysinger and C. A. Ruckmick, *op. cit.*, pp. 102–104.

[2] B. R. Schaefer, The effect of movement on the electrodermal response, *Psychol. Monog.*, 48, 1936, No. 2, 57–73.

blindly, although obviously exhausted (30). This record was obtained from a female graduate student, twenty-three years of age, who reported among other experiences the anticipation of a fight at (4), tension over the whole body at (5), cutaneous strain over the scalp area at (6), and deeper breathing at (7). The vertical lines indicate five-second intervals and the figures to the left are the calibrated dermal resistances in ohms.

From a number of studies, including the ones just now mentioned, we can make a preliminary distinction between the form or the temporal

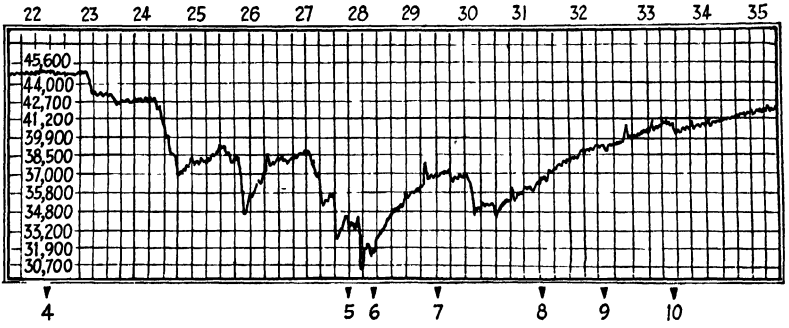


FIG. 45.—Reproduction of photographic curve indicating an electrodermal response to a motion picture situation. (*Courtesy of Dr. Greenwald.*)

course of a deflection primarily due to affective processes and the type of graphic curve obtained from motor responses *per se*. In general we notice that the curve for movements of all sorts is of the 'mound' type illustrated thus:

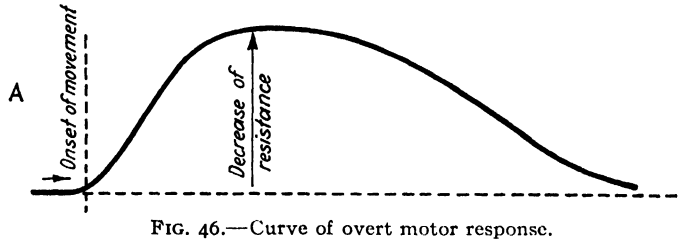


FIG. 46.—Curve of overt motor response.

On the other hand, the most frequent type of curve photographically recorded from a predominantly affective experience takes the form as shown at the top of page 366 (Fig. 47). It might for convenience be called, in contradistinction to the former, a 'cliff' type of curve. Of course, there are many modifications of both 'A' and 'B' types of curves and a few anomalous cases, but, with thousands of such curves in our protocols, it is easily possible to make these generalizations. Difficulties arise when there is an overlapping or intermingling of

these two classes of processes. Here at least is a beginning of needed analysis.

On the side of general bodily and mental condition, we have carried on some experiments involving extreme bodily and mental fatigue. Data from twenty-nine experimental trials tend to show that with a

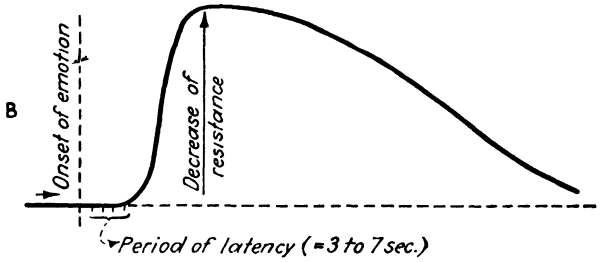


FIG. 47.—Curve of affective phenomena.

few exceptions there is a definite increase in resistance after exhaustion with its depressing effect. These readings must be considered only as

Trial	*N*	*F*	—	Trial	*N*	*F*	—	Trial	*N*	*F*	—	Trial	*N*	*F*	—
1	62	67	5	8	73	68	−5	15	51	49	−2	22	71	70	−1
2	57	51	−6	9	57	55	−2	16	63	57	−6	23	58	55	−3
3	72	73	1	10	69	63	−6	17	75	71	−4	24	74	70	−4
4	55	49	−6	11	47	49	2	18	52	53	1	25	72	68	−4
5	59	54	−5	12	59	53	−6	19	51	49	−2	26	55	51	−4
6	48	44	−4	13	64	60	−4	20	58	53	−5	27	51	49	−2
7	78	79	1	14	73	69	−4	21	63	60	−3	28	63	60	−3
												29	79	73	−6

N = normal, increased potential (or decreased resistance)
F = fatigued, decreased potential (or increased resistance)
All readings are potentiometer readings on the Hathaway apparatus.

indications, since accurate quantitative work can not be done with the Hathaway apparatus. The trend, however, is manifestly in the direction opposite to that of the affective processes, which usually involve the opposite type of attentive alertness and bodily vigor. Introspective reports from a number of observers reveal a sort of 'vegetative' mental life with a great scarcity of ideational material and an indifferent attitude. During the experiment, which lasted about an hour at each session, vigorous setting-up exercises were performed, at the same time continuous arithmetical and other problems were solved, scoldings were administered, and painful cutaneous stimuli, distasteful gustatory solutions, and obnoxious odors were repeatedly given. Photographs of the facial expressions of some of the observers would convince any-

one that the state was one of extreme bodily fatigue and mental lassitude. These results extend the work of Strauss, who used the galvanic technique to measure the electrodermal response during and after strenuous physical exercise. He concluded that the rate of return to the normal readings was an indication of the degree of fatigue obtained during the experiment.[1] Our curves show deflections above the normal during exercise (decreased resistance) and a dipping below the normal (increased resistance) during exhaustion.[2] Seward and Seward have discovered a continued negatively accelerated decline of resistance

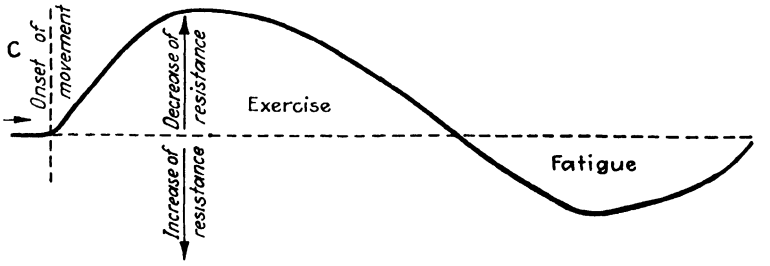


FIG. 48.—Curve of exercise and fatigue.

during an experimental period of eight minutes and also with the administration of electric shocks on five consecutive days. The significance of these findings is not yet clear. Possibly they point to a gradual conditioning process in this part of the autonomic nervous system analogous to fatigue.[3]

Another possibility lies in the correlation of the form of the curve, traced from the galvanometric deflection, with the various types of affective processes. There is some inclination to regard the complete course of the deflection in a way that is quite comparable to the treatment of

[1] W. Strauss, Über eine neue Methode zur Messung körperlicher Ermüdung, *Klin. Woch.*, 6, 1927, pp. 483–487; Grundlagen fur eine neue Methode der Ermüdungsmessung, *Zeits. f. Hyg.*, 107, 1927, pp. 56–101.

[2] Wechsler noted an increased bodily resistance in the early evening and at night and therefore assumed that fatigue produced this result but he could not account for the fact that high resistance was also found in the early morning hours, The measurement of emotional reactions: researches on the psychogalvanic reflex, *Arch. of Psychol.*, 12, 1925, No. 76, p. 75. If decreased metabolic rate can be considered as the common denominator, the depressed or relaxed condition would hold for the early morning hours as well as for those of the early evening and night. These conclusions agree with the results of Waller and with the data obtained by Bose on plant and animal tissue when its electrical conductivity was impaired by fatigue. V. A. D. Waller, Periodic variations of conductance of the palm of the human hand, *Proc. Roy. Soc.*, B., 91, 1919, pp. 32–40; J. C. Bose, *Comparative Electrophysiology*, p. 236, 1907.

[3] J. P. Seward and G. H. Seward, The relation of galvanic skin reactions to preceding resistance, *J. Exper. Psychol.*, 18, 1935, pp. 64–79.

other physiological processes which have been used in expressive procedures. In our summary of the work done on the latter processes we commented favorably on the emerging tendency to relate affective occurrences to 'patterns' of breathing and circulation. Darrow, who has done some of the most careful work on the electrodermal response, has pointed to that phase of the curve which indicates the return of the galvanometric deflection to the base line.[1] This he called the 'recovery curve.' Like Benussi's respiration ratio, Darrow discussed his results in terms of the 'recovery-reaction quotient.' He found that the greater the anxiety or mental tension the less steep was this portion of the curve. A large number of investigators have already shown that there is a fairly good relationship between the intensity of feeling and the amount of the deflection,[2] although there is some evidence to the contrary, especially with revived emotions as reported by Washburn and Pisek.[3]

In this area it should be possible to run some crucial experiments under controlled conditions which would settle the minority issue. Many of the investigators who have directed their attention to this problem appear to declare that the degree of deflection indicates a valid correlate for the intensity of affective experience. There is some evidence, too, in favor of a more pronounced deflection being obtained from sensorially and perceptually aroused feelings than from feelings with a large ideational cognitive factor. In other words, as the feelings approach the level of sentiments, smaller deflections are normally in order as compared with the more primitive emotional disturbances. Within the emotional range itself, those emotions that involve a large ideational component, such as anxiety and dread, with obviously a smaller bodily disturbance, tend to be represented by deflections of a smaller magnitude. The temporal course of emotions, as introspectively recorded, is also reflected by the form of the deflec-

[1] C. W. Darrow, The significance of the galvanic recovery curve, *Psychol. Bull.*, 28, 1931, pp. 678-679.

[2] D. Wechsler, *op. cit.*, pp. 119 ff. *V.* also, E. Patterson, A study of the emotion of surprise, *Psychol. Monog.*, 40, 1930, No. 1, p. 99; A. R. Lauer, Reliability of the galvanic reflex, *Amer. J. Psychol.*, 41, 1929, pp. 263–270, in which he tested merely the statistical reliability of the electrodermal response (not the validity) and found it to be very high if calculated on the basis of the ratio of apparent ohmic change to initial bodily resistance; H. Syz, Psychogalvanic studies on sixty-four medical students, *Brit. J. Psychol.*, 17, 1926, pp. 54–69; W. W. Smith, *The Measurement of Emotion*, pp. 30–40; 113–118, 1922.

[3] M. F. Washburn and F. Pisek, Galvanometer experiments with revived emotions as a test of emotional and phlegmatic temperaments, *Amer. J. Psychol.*, 36, 1925, pp. 459–460.

tion, so that, as Bayley found, apprehensive fears are experienced as of longer duration and are accompanied by more prolonged curves of deflection than are sudden startles.[1] Similarly in the emotion of surprise Patterson found that intellectual surprises, as when one is momentarily taken unawares at the quick turn of a phrase or an unexpected ending to an anecdote, accompanied by the subvocal verbal comment or attitude of "Well, I'll be damned!" "Goodness!" or "What happened?" gave less of a deflection than sheerly physical surprises.[2] Combining these two studies, a significant comparison might then be made, on a tentative basis and subject to future amplification and revision, which could be outlined as follows:

	Predominantly Sensory		Predominantly Ideational	
Fear	Startle	Typical Fear	Dread	Apprehension
Surprise	Sensory Surprise		Ideational Surprise	

Some of the work which Darrow has summarized fits in with this scheme.[3] He distinguishes the responses by showing that sensory stimuli when affectively colored are more apt to be accompanied by galvanic deflections, whereas ideational material and particularly associated verbal reactions are more effective in increasing cardiac activity as indicated by pulse rate and blood pressure.

Naturally we must not forget that emotions themselves may have varying degrees of intensity and complexity and that genetically less developed simple affections of pleasantness and unpleasantness, like those attached to colors, sounds, odors, tastes, *etc.*, may in their own way be comparatively mild experiences with even less of a bodily disturbance accompanying them than the 'subtler' or 'gentler' emotions. So many factors enter the picture that it is not altogether a simple matter to draw sweeping generalizations. Nor is it ever safe, especially in a realm that is not yet well ordered! Then "sudden, decided and momentary checks in the course of comprehension and the solution of simple problems of an elaborative sort," which also gave electrodermal responses in Abel's study, would extend our line of "ideational surprises" still farther.[4] But at the same time we wonder whether

[1] N. Bayley, A study of fear by means of the psychogalvanic technique, *Psychol Monog.*, 38, 1928, No. 4, pp. 31–32;

[2] *Op. cit.*, *Psychol. Monog.*, pp. 102–106.

[3] C. W. Darrow, Differences in the physiological reactions to sensory and ideational stimuli, *Psychol. Bull.*, 26, 1929, pp. 185–201.

[4] T. M. Abel, Attitudes and the galvanic skin reflex, *J. Exper. Psychol.*, 30, 1930, pp. 47–60.

any well-informed investigator in the field need be told that the electrodermal response "is not an indicator of some general psychological class, as of emotions, conations or volitions," as contradiction of a "widespread belief." The points raised in this chapter should cause no one to hold a brief for this absurd doctrine any more than one would attribute to the changes of cardiac activity, for example, the pre-empted right of speaking for a special 'psychological class' of processes!

8. Summary.—We have wound our way through a maze of electrical detail that may seem well-nigh baffling but which in itself, so far as we have condensed it, is only the minutest fraction of the whole story. For more detailed problems, of which there are many and than which there are no more complicated discussions in the whole range of literature on the affective life, we must refer the reader to the special literature. Again we can say that while the exploration has only begun, promising results lie ahead. The specific approach to the problem of the electrodermal response came to a well-worn trail near the close of the last century, and with the early decades of the present century the trail became a wide thoroughfare with many travelers from numerous lands on their several ways. As of our present civilization one may say, there is much traffic but what is the goal?

A goal seems to be that while the electrodermal response is linked with a long array of physiological and mental conditions and processes, it shows a characteristic and pronounced effect in relation to affective processes, especially of the emotional sort. Since from our psychogenetic theory we have a right to expect that the autonomic nervous system is highly instrumental in conveying impulses to many parts of the body in connection with emotional disturbances, it is not amiss to suppose that one of the manifestations of its function is mediated through the electrical activity of the sweat glands. Our increased knowledge of electrical phenomena together with rapid advances in electrical techniques looking toward the amplification of extremely minute electrical currents has made it possible to ferret out some of the bodily responses and to study them more thoroughly in connection with the mental life. As Herrick has recently said, much can be expected of additional facts still to be gleaned by means of these techniques:

"The inconceivable complexity of the fabric of nerve cells and fibers in the brain is slowly yielding to patient analysis, and we now have instruments cunningly fabricated of radio tubes and other recently invented electrical appliances that record the changes in electrical potential (action-currents) of nerve fibers in millionths of a volt. Prophecy is dangerous, but I venture the prediction that the invention of the oscillograph with radio tube amplifiers

will revolutionize the physiology of the nervous system as radically as the introduction of the compound microscope regenerated the science of anatomy."[1]

It has been true in the past, with few exceptions, that advances made in our neighboring disciplines have aided us in psychological techniques. There is every reason to believe that one of the main approaches to problems in the areas of feeling and also of motor learning will continue to be electrical. The action-current and the electrodermal response offer many possibilities if the results are not too hastily interpreted. Many improvements have already been made, as we have shown in the matter of electrodes and of electrical circuits.

The note of caution has been repeatedly sounded. But we can say that, with few contradictions, there is a strong tendency to correlate the degree of deflection with the intensity of the affective experience. Allowance has to be made for adequate introspective evidence. Another emerging fact is that different types of feelings and emotions are generally being distinguished in terms of the patterns which the curve of deflection presents over a period of time. On this basis we can begin to place certain phases of typical emotions like fear and surprise in linear relationship one to another and trace a possible genetic development in the series. The sensory and ideational factors can be analyzed and compared in the introspective reports. The quantitative measurement of such forms already reveals a difference in pattern and intensity. The item of movement and the problem of fatigue face us as matters to be held under more rigorous control during experimental procedures.

We also advocated the adoption of the phrase 'the electrodermal response' in place of the traditional psychogalvanic reflex (PGR) for reasons that were given. The advantages of various typical circuits were also considered in detail. The prime requisite for most work today is that the current through the observer be preferably an alternating flow to eliminate many of the difficulties in the electrodal connections and to assure a fair means of obtaining quantitative results when the deflections reveal changes in ohmic resistance.

Further problems and results will be given later, when the subject will turn to work done on children and on clinical individuals. One of the features of research work today is the multilateral bearing which results have on contiguous problems which for systematic reasons have to be treated in separate chapters. The present chapter can not

[1] C. J. Herrick, Our knowledge of the brain set forth in simple terms, *New York Times*, Sunday, Jan. 20, 1935.

offer a complete summary of the work that is being reported from many widely scattered laboratories. Questions of a purely physical or physiological nature must also, for the most part, be omitted.

Review Questions

1 What is the possibility of conditioning processes reaching the sweat glands through neural connections?

2. At what time and upon what basis were electrical techniques first used as an approach to the feelings?

3. To what extent are the textbook citations, in relation to the electrodermal response, accurate?

4. Discuss two chief errors, assignable to the electrodes, which may interfere with the proper recording of responses in terms of electrical units.

5. Mention at least four important requirements concerning electrodes

6. What are two essential characteristics of the best circuits available for use in recording electrodermal responses?

7. Defend the statement that a specific emotion can not be described from the angle of the objects or situations which are used to arouse such an emotion.

8. What are the several conditions, other than affective ones, which may arouse an electrodermal response?

9. Distinguish a 'motor' type of deflection from the 'affective' type.

10 What can be said in favor of using the form or pattern of a curve of deflection as indicative of different types of feelings and emotions?

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CHAPTER XII

THE EXPERIMENTAL PROCEDURES OF IMPRESSION

Every introduction to the problems of aesthetics begins by acknowledging the existence and claims of two methods of attack,—the general, philosophical, deductive, which starts from a complete metaphysics and installs beauty in its place among the other great concepts; and the empirical, or inductive, which seeks to disengage a general principle of beauty from the objects of aesthetic experience and the facts of aesthetic enjoyment: Fechner's 'aesthetics from above and from below.'

E. D. Puffer, *The Psychology of Beauty.*

1. The General Problem from Another Angle.—Because it is difficult to make a direct frontal attack on the feelings and the emotions, two indirect procedures have been devised. In the last few chapters we have gone into the work done by means of the procedure of expression in general and the various specialized techniques subsumed under it. All these techniques depend upon the implied principle that physiological responses of many different sorts occur in connection with affective situations at the same time that mental experiences take place. These two sets of processes, the physiological and the mental, are interrelated but not by any means equivalent. They go hand in hand. When we follow such techniques as we have described, we do well to get a twofold report: (1) a notation of all the discoverable bodily changes and (2) an account of the mental experience even if it has to be given retrospectively immediately after the occurrence. We also have, as a matter of course, (3) a precise description of the physical object, situation, or event which occasioned the experience. In some comparatively rare instances the bodily symptoms, especially when they are due to the injection of drugs like adrenalin, may themselves become the occasion of a quasi-emotion or even of a real emotion. But by and large, while from what is left of the James-Lange-Sergi theory we may still include the bodily resonance on occasion and to some degree most of the time, the cognitive element directed toward a situation in the environment or in our relation to that environment is one of the most important factors in the complete picture. We have taken considerable effort, therefore, to tell what goes on in the body so far as that has been adequately revealed, but we must still face another essential problem: what goes on in the experience of the person who is undergoing a feeling or more especially an emotion. The solution of that

problem, though extremely important, is exceedingly difficult. Just how it can be brought about will be discussed in the next chapter.

Now we have to do with an easier procedure, the second of the indirect attacks: the procedure of impression. Here some introspective analysis is used, although much of the report of experience is a sort of commentary of experience rather than an analysis. Knowledge of scientific terms is not necessary—the reactions of the subject to the materials presented are generally all that is needed. In some cases, however, more extended reports or evaluations of feeling are called for. The general principle here followed is the tendency of feelings to attach themselves to objects and phases of objective situations, which objects, situations, relationships, and events can be cognitively or perceptually scrutinized and reported. Attention in the matter of report is then theoretically directed to the thing cognized and only incidentally is the feeling noted, sometimes merely, indeed, by way of comparison. You like this odor more or less than that odor, or this color looks more agreeable than that color, or this is the ugliest face in the series, or the verbal concept of friendship is three times as pleasant as that of acquaintanceship.

As in the case of the procedure of expression, special techniques have been devised to control accidental errors that may arise in the course of the experiment. They also provide fruitful ways of comparing results obtained by the different techniques in regard to the same stimulus objects. In this connection it is sometimes supposed that the affective responses obtained refer to the simple qualities of the several sensory modalities, but it can be shown that when we are voting on our pleasurable reaction to a given color quality, it is quite likely that the mental process is not strictly sensory but perceptual. In an unpublished investigation the writer has proved that, when a series of colored papers is used as a basis for affective judgment in regard to the relative pleasantness and unpleasantness of members of the series, the results will be quite different from those obtained when the same colors are presented on cloth materials. But before we go into such details, let us glance at the development of the procedure of impression and the techniques that have been used. On the whole this type of approach is serviceable in laying a foundation for aesthetics as applied to the various arts. It also is useful in meeting special problems that arise within the several arts as, for example, the predominant use of certain colors in conventional patterns, the avoidance of definite tonal combinations in musical compositions, and similar instances in the use of cosmetics. The likes and dislikes of color and of certain tonal effects in the various cultures and primitive races have also been studied from the stand-

point of anthropology. Another pertinent problem concerns the possibility of sex differences in the affective response to colors, odors, tastes, and the like as well as a general difference between men and women in the degree of response to all classes of qualities. Most of us have heard that boys prefer red while girls prefer blue. Advertising is another field where the matter of the choice of color is important both from the attentive and the affective aspect. These are some of the many interests that are involved in the subject that is now before us.

2. The Historical Development of the Procedure of Impression.—The origin of the procedure of impression probably dates back to 1871 when G. T. Fechner proposed three separate techniques[1] to investigate quantitatively the degree of affective tone that is attached to various perceptual experiences. Thus as a groundwork for his aesthetics he wished to obtain an affective weighting for the different sensory qualities and particularly for the proportionate length or extent of lines. These might be named (1) the *technique of choice*, (2) the *technique of performance*, (3) the *technique of practice*. In the first case the observers were told to select that proportionate length of lines in a rectangle which seemed intrinsically most pleasing and then that which was least pleasing. A large group of observers were used and the results were tabulated in accordance with their combined vote, which was numerically rated. The proportions that were rejected were interpreted as if they were disliked. In the second instance a large number of observers were asked to produce the most pleasing proportion. The frequency distribution of the results afforded a quantitative measure of the most pleasing proportion. The third technique required that a large number of objects of a simple nature in industry and in everyday life be considered from the point of view of their inherent relationships to see what proportions had been empirically adopted in the greatest number of cases.

Of these techniques the last two have fallen into disuse. The first, however, has not only been varied from time to time but has been given three different forms known under the names of (*a*) order of merit, (*b*) paired comparison, and (*c*) single exposures. A number of variations have also appeared from time to time. Among them are the proposals of Witmer in 1893 and of Martin in 1905. Witmer renamed the Fechner technique of choice, the technique "of regular arrangement of figures," in which the stimuli should be simultaneously presented in a series of regular gradations ranging in an increasing or a

[1] G. T. Fechner, Zur experimentellen Aesthetik, *Abh. d. Math.—Phys. Cl. d. k. Sächs. Ges. d. Wissensch.*, 9, 1871, pp. 555–635.

decreasing order from $\frac{1}{\infty}$ to ∞ as regards the attribute on the basis of which affective judgments are to be made.[1] Martin also varied the method of choice by having some one attribute of a sensory presentation, *e.g.*, its length, gradually change until the observer declared the attribute the most satisfactory. It was her purpose by this sort of a modification of the classical psychophysical method of limits to establish a criterion of the comic element. A German dachshund might thus become gradually lengthened or shortened until the most comical effect was reached.[2] This is, indeed, an interesting variation of a problem which historically dates back to the Aristotelian 'golden mean' in its original conception! Many other problems in this field were similarly attacked.

In its most common form the order-of-merit procedure dates its beginning to a suggestion of Külpe in 1893, later expanded by him in 1906 into what he called the 'serial method.' Külpe had his observers arrange all the objects in a linear series, which could at first be roughly approximated and then worked out in greater detail. At the start, then, the procedure would follow the technique of simple choice as regards the most pleasant and the most unpleasant objects. When the series is complete with the objects supplied, unequal steps of gradation between the objects may be recognized, but relative to one another there is at least a positional difference. In other words, a series of colors placed in a row can not be presumed to occupy positions in the series which are equidistant one from another from a quantitative aspect as regards affective tone. Probably the most plausible attempt to rectify this situation has been made by Thorndike.[3] By means of a statistical table of frequencies the units of position are transmuted into units of relative amounts. He advised that the table be limited to judgments whose frequency falls between 65 and 85 per cent. Beebe-Center rightly regretted that this table of conversion has not been more extensively used in psychological experiments in the algedonic tone of sensory stimuli.[4]

In many cases possible objections to any form of serial arrangement where the stimuli are spatially presented are forthcoming. With colored

[1] L. J. Martin, Psychology of aesthetics, I. Experimental prospecting in the field of the comic, *Amer. J. Psychol.*, 16, 1905, pp. 35–118.

[2] L. Witmer, Zur experimentellen Aesthetik einfacher räumlicher Formverhältnisse, *Philos. Stud.*, 9, 1894, pp. 96–144, 209–262.

[3] E. L. Thorndike, *An Introduction to the Theory of Mental and Social Measurements*, 2d rev. and enlarged ed., pp. 122–124, 1916.

[4] *Op. cit.*, p. 19.

papers, for example, contrast and complementary effects between neighboring colors can not be easily overcome. Also even when a medium gray is used as a general background, true blue and true yellow may suffer from different contrast effects. The effect of saturation and brilliance also enters the picture. But Major found that large expanses of color were not suitable for experimental purposes.[1] It is quite likely that a certain degree of attitude can be maintained so that the algedonic judgment can be given directly in terms of each separate quality. With tones this attitude is still harder to assume because of relational effects that appear in a thematic or melodic sequence, to say nothing of the factor of musical dominance in the tonic or the feeling of expectancy presented in the leading tone. Naturally in all these, associative effects are to be avoided as much as possible by having the judgments given as quickly as the experiment will permit, but an objective reference to material and surface texture as a part of the perceptual experience is hard to avoid in the case of visual stimulation. In many forms of the technique of serial order it is also necessary to overcome any disposition toward a spatial error, which might vitiate the results through a tendency to place objects preferably to the right or preferably to the left, by reversing this spatial arrangement, *e.g.*, if the most pleasant color has been placed at the right and the most unpleasant to the left, the trial should be repeated with the most pleasant color at the left and the most unpleasant one to the right. In that case, since the memory of the first arrangement may be carried over to the second, either alternate series should be used with a different set of papers or the second trial should be begun only after a long interval.

The technique of paired comparisons was probably first devised by Fechner[2] to avoid a constant error resulting from the fact that many observers prefer intermediate members of a series regardless of their intrinsic algedonic tone. It is not a technique that has been used only in the field of the feelings and the emotions; on the other hand it has probably been used more widely in that field than any other technique. In 1894 Cohn improved upon the haphazard arrangement of Fechner and proposed an orderly arrangement of the pairs of qualities to be shown to the observer.[3] The technique follows the schedule shown at the top of page 378 where the Roman numerals refer to the colors to be paired and the Arabic numerals give the order in which the pairs are to be presented.

Vance has provided us with a convenient double frame in which these colored papers may be mounted and with proper rotation pre-

[1] D. R. Major, On the affective tone of simple sense-impressions, *Amer. J. Psychol.*, 7, 1895, pp. 55–77.

[2] G. T. Fechner, *Zur experimentellen Aesthetik*, 1871.

[3] J. Cohn, Experimentelle Untersuchungen über die Gefühlsbetonung der Farben, Helligkeiten und ihrer Combinationen, *Philos. Stud.*, 10, 1894, pp. 462–603.

	I	II	III	IV	V	VI	VII	VIII	IX
II	1								
III	2	3							
IV	18	4	5						
V	19	20	6	7					
VI	31	21	22	8	9				
VII	32	33	23	24	10	11			
VIII	40	34	35	25	26	12	13		
IX	41	42	36	37	27	28	14	15	
X	45	43	44	38	39	29	30	16	17

sented readily to the observers[1] and the papers are thus also better preserved from marring, which obviously affects the aesthetic judgment. To correct any possible influence of fatigue the entire series should be reversed so that the forty-fifth comparison becomes the first and so on through the series. Again both series should be repeated with the observer indicating the more *unpleasant* of the two in each pair. Fernberger has checked the frequencies of these two series, however, *i.e.*, those obtained through a choice of the *more pleasant* of the two in a pair with those obtained through a choice of the *more unpleasant* of the two and has found a surprisingly small statistical difference. This result indicates that the one affective quality is probably a true mental opposite of the other and that they are not influenced by the verbal form of the judgment.[2] Since the verbal form of the choice, *e.g.*, 'yellow,' 'yellow streak,' 'yellow journalism,' *etc.*, may have a different algedonic value than that attached to the color quality itself, the vote had better be given by arbitrary signs, taps (*e.g.*, 1 for right, 2 for left).

Many suggestions have been advanced looking toward the improvement of the technique. Cohn advised that since each color appears twice in the successive pairing, thus encouraging a space error, it should be placed once to the right and the second time to the left, or *vice versa*. Beebe-Center proposes that the time error of succession should be taken care of by a redistribution by trial and error after the schedule shown above has been used for the pairing process. Obviously under such circumstances there would be no need for Cohn's schedule at all. If a schedule is needed which shall eliminate both the time and space error and yet present a simple order of

[1] C A. Ruckmick, New laboratory equipment, *Amer. J. Psychol.*, 27, 1916, pp. 540–541.

[2] S. W. Fernberger, Note on the affective value of colors, *Amer. J. Psychol.*, 25, 1914, pp. 448–449.

procedure for the experimenter to follow, the plan given below is suggested by the present writer:

	I	II	III	IV	V	VI	VII	VIII	IX
II	1*								
III	*10	2*							
IV	18*	*11	3*						
V	*25	19*	*12	4*					
VI	31*	*26	20*	*13	5*				
VII	*36	32*	*27	21*	*14	6*			
VIII	40*	*37	33*	*28	22*	*15	7*		
IX	*43	41*	*38	34*	*29	23*	*16	8*	
X	45*	*44	42*	*39	35*	*30	24*	*17	9*

NOTE: Asterisk after Arabic numeral indicates that color represented by Roman numeral at the top of the chart should be placed to the right of the other color, and *vice versa*.

As before in connection with the technique of serial order, the criticism has been made that this technique of paired comparisons yields a measure of affective tone in terms of a frequency of preference in successive pairs, *i.e.*, relative to each other quality as presented pair-wise. When this frequency is calculated for all pairs, as a measure of absolute affective value, a false assumption is thereby involved. In other words, the observer plainly did not assume the attitude of judging the relative degree of pleasantness or unpleasantness of any one sensory quality as compared with all others, but only in each separate case with some one other sensory quality. It were a false psychological interpretation to assume that mere calculation of frequency would reveal an intrinsic amount of affective response. Calculations are not necessarily mental reals.

Thurstone has proposed a formula which with his later refinement is fairly complicated. The problem is stated in Thurstone's version as follows:

"It is usually assumed that equally often noticed differences are equal on the psychological continuum. They are rarely assumed to be equal on the stimulus continuum. It is however incorrect to assume that pairs of stimuli are equally distant on the psychological scale even though all the pairs are equally often discriminated. It is not even correct to say that stimulus differences *seem* equal, or that they are subjectively equal, just because the differences are equally often noticed."[1]

But Guilford has devised two short cuts, the first of which yields data that correlate in the neighborhood of .99 with those obtained by means of the

[1] L. L. Thurstone, Psychophysical analysis, *Amer. J. Psychol.* 38, 1927, pp. 368–389; The method of paired comparisons for social values, *J. Abnorm. & Soc. Psychol.*, 21, 1927, pp. 384–400; The measurement of opinion, *J. Abnorm. & Soc. Psychol.*, 22, 1928, pp. 415–430.

Thurstone formula,[1] but the method applies only to data whose frequencies lie between 15 and 85 per cent. In that case simply the number of times one stimulus was judged to be greater in a given way than any other stimulus is taken as a measure of its relative value. If the frequencies exceed these limits, however, then the average of the frequencies for each stimulus must be taken and the scale value follows from this calculation in a table of the normal probability integral. These are statistical refinements of a technique which has done long service in the field of investigation concerning affective responses, but they are not required where preliminary determinations are made. For careful research, however, these modifications furnish added precautions against fortuitous assumptions.

We now come to the third form which the technique of choice assumed. It has been named the 'method of single or isolated exposure.' Major proposed it in 1895 as a variation of Külpe's serial method in order to overcome the effect of contrast between neighboring colors. Other investigators have since used it with modifications. In this technique the colors or other stimuli are judged separately on an arbitrary scale of values. It is thus sometimes referred to as the 'scale of values method.' Major used a seven-point scale: (1) very pleasant, (2) moderately pleasant, (3) just pleasant, (4) without affective tone, (5) just unpleasant, (6) moderately unpleasant, (7) very unpleasant. Although other experimenters have used as few as three scale values and as many as twenty, the common practice has been to use seven steps, usually with numerical values attached ($+3$, $+2$, $+1$, 0, -1, -2, -3). When such numbers are used, especially a large series of numbers beyond the customary seven, a new source of error may enter the picture, namely, the preference for certain numbers, principally round numbers. This predilection for round and other familiar numbers is well shown and has received considerable attention in experimental studies.[2]

Several investigators have come to the conclusion that any form of the procedure of impression has its drawbacks. Some have shown that in research work two phases of the experiment should be distinguished and separately controlled: (1) the degree of pleasantness and unpleasantness, or the indifference, which is directly attributable to the analogue of the stimulus

[1] J. P. Guilford, The method of paired comparisons as a psychometric method, *Psychol. Rev.*, 35, 1928, pp. 494–506.

[2] J. E. Coover, Experiments in psychical research, *Leland Stanford Jr. Univ. Publ., Psychical Research Monog.*, No. 1, 1917, pp. 230 ff.; E. S. Conklin, The scale of values method for studies in genetic psychology, *Univ. of Oregon Publ.*, 2, 1923, No. 1; J. G. Beebe-Center, The law of affective equilibrium, *Amer. J. Psychol.*, 41, 1929, pp. 54–69; P. T. Young, Studies in affective psychology, VIII: The scale of values method, *Amer. J. Psychol.*, 42, 1930, pp. 17–37. *V.* especially pp. 23–24.

and which therefore may be called perceptual, *e.g.*, the pleasant odor, the unpleasant taste, *etc.*, of certain objective stimuli, and (2) the degree of pleasantness and unpleasantness, or the indifference, which is attached to the entire experience, *e.g.*, during a laboratory session or during a social party, as a part of which such isolated stimulations occur. Some years ago the writer recognized this interplay of affective situations when he devised a series of experiments on the relation of the current mood of the individual to the affective judgments made in response to color stimulation by the technique of the order of merit, discussed above. Fifteen observers were used. During the first half of the hour they were entertained, given a pleasant environment in the form of anecdotes, musical selections, prize photographs, and poetic readings, after which they judged the comparative affective values of a series of twelve cards on which colored papers of nearly full saturation were mounted. The series was repeated with unpleasant situations including disagreeable odors, gruesome stories, scoldings, threats of electric shock, and the like. A second set of cards had to be used with this series to avoid the error of memorization. Also the unpleasant series had to precede the pleasant series half of the time to avoid the factor of expectation. Then another series had to be run under normal conditions to show what variations in the order of selection of cards would occur by chance factors not under control. While there were some individual differences among the observers, it was clear that the general affective background of the observer, which influenced the experience as a whole, changed his likes and dislikes of specific stimuli. The most liked and the most disliked stimuli did not change, as a rule, but the intermediates showed many alterations in their relative positions as to affective value. In setting up experimental procedures it is therefore well to distinguish between the affective toning of particular items in the experience and the affective tone of the experience as a whole. One phase is conditioned by the other; only approximately can we separate them.

Another valid criticism which has emerged and which indicates a related problem is the attack on the judgment of affective tone as an expression of *absolute* value. If we are to pay heed to some of the lessons of Gestalt psychology, we may find a just application of one of the principles of this lately emphasized doctrine. It is a problem that is related to the one referred to in the preceding paragraph. Not only the context of the entire experience provides a setting into which specific affective values are thrust, but the context of other evaluated members of a series furnishes a frame into which each separate judgment is *relatively* placed. Using 15 different odors and an empty control bottle with 200 subjects who were university students and who were equally divided as to sex, Young and his colleagues, for example, concluded that the general affective value of an odor varies with its position in a series. They also discovered that 50 children seven to nine years of age and 50 children eleven to thirteen years of age are

similar in their likes and dislikes for odors to the adults studied in the previous group.[1] It is an old problem recognized by some of the earliest writers on the subject and leads straight to the sort of concept which Beebe-Center has called 'the law of affective equilibrium.' This 'law' is stated in the following terms:

"The affective value of the experiential correlate of a stimulus varies conversely with the sum of the affective values of those experiences preceding this correlate which constitute with it a unitary temporal group."

No satisfactory explanation of this 'equilibrium' is at hand, however, since in many experiments involving the repetition of affectively toned stimuli affective habituation does not appear to set in. But hypothetically we may conveniently count on such an equilibrium to explain not only the appearance of *relative* evaluations of affective tone, but also the occurrence of so many unpleasant emotions and feelings. These, then, would be construed under the principle of 'equilibrium' as deviations from the fairly comfortable manner of living during the greater portion of daily experience.

This discussion leaves the general impression, no doubt, that all the specialized techniques, which form a part of the procedure of impression, must be critically scrutinized. So careful a worker in this field as Young is definite in his statement that "the 'scale of values' method may yield statistically uniform results," but that the interpretation of these uniform results is open to question unless the experimenter has sufficiently controlled the dual situation described in a preceding paragraph. Beebe-Center explicitly states that "the method of single stimuli is in general the best method" as regards appropriateness, completeness, and convenience. From the point of view of convenience the technique of order of merit is judged by him to be second best. The technique of paired comparisons is, however, still in general use and if properly guarded and statistically re-evaluated should also prove to be a serviceable tool in the study of affective responses to various classes of objects.

3. Some Typical Results.—Many of the problems which lie within the area attacked by the procedure of impression involve the use of colored stimuli usually in the form of colored papers. Although probably no sensory modality is without the possibility of algedonic toning, the visual, olfactory, and auditory sense modalities have been the most frequently investigated. For various reasons the visual and olfactory

[1] E. H. Kniep, W. L. Morgan, and P. T. Young, Studies in affective psychology, XI: Individual differences in affective reaction to odors, *Amer. J. Psychol.*, 43, 1931, pp. 406–421.

field have been most favored. For one thing, auditory sensations more readily lend themselves to melodic sequences when successively presented and to fusions when simultaneously presented. The latter difficulty may also be present to some extent in the case of odors although, generally, compounded odors have been considered as mixtures of stimuli with the same sort of 'reference' or 'orientation' that is found, let us say, in the color of orange to the points on the spectrum occupied by primary red and primary yellow. Few persons will deny that the affective tone of color has a field of wide use and interest.

This radical difference between colors and tones is well brought out by several experiments which yielded the generally uniform result that in the case of colors the algedonic value of combined effects varies directly with the sum of the algedonic values of the separate stimuli. The result, however, does not equal the simple addition of the individual values.[1] Guilford attempted to work out a statistical treatment of data obtained from 249 university men and 211 university women who were instructed in the various groups to judge the affective value of the visual stimuli in the form of lights, either singly in one group or in combination in another group of subjects. Highly valid predictions were made possible for the men, but not for the women. There were some indications that the summation of feeling is an additive one and not a product. The combined value was not an algebraic sum but a weighted mean of pleasantness and unpleasantness or of some simple mathematical function of these qualities.[2] Besides, in a relatively small number of cases two definitely unpleasant colors may occasion a pleasing response when combined while two pleasantly toned colors may in combination give an unpleasant result. It is also fairly certain that the form which a colored object has can be independently judged as regards its algedonic value; and that color can be judged independently of form on the same basis. These two aspects are therefore regarded as independent variables. In a recent study, moreover, the size of the colors presented, with the possible exception of yellow and orange, made no significant difference in the affective response to the colors. When tones are used, however, either as separate stimuli, as clangs, as successive intervals, as chords or as a series of chords, experimenters have found that the combined effects bear no relation to the effects of the component parts.[3] Such a result can be easily understood

[1] L. R. Geissler, The affective tone of color-combinations, in *Studies in Psychology* (Titchener Commemorative Volume), pp. 150–174, 1917; M. F. Washburn, D. Haight, and J. Regensburg, The relation of the pleasantness of color combinations to that of the colors seen singly, *Amer. J. Psychol.*, 32, 1921, pp. 145–146; M. Yokoyama, Affective tendency as conditioned by color and form, *Amer. J. Psychol.*, 32, 1921, pp. 81–107.

[2] J. P. Guilford, The prediction of affective values, *Amer. J. Psychol.*, 43, 1931, pp. 469–478.

[3] K. Danzfuss, *Die Gefuhlsbetonung einiger unanalysierter Zweiklange, Zweitenfolgen, Akkorde und Akkordfolgen bei Erwachsenen und Kindern*, 1923.

when one recalls that even unpleasantly harsh discords become agreeable in music when proper resolution takes place or when they form a part of an otherwise pleasing whole.

When we consider separate stimuli, a wealth of material lies before us. Again most of the work done by this procedure has to do with colored stimuli. One of the earliest questions which arose centered around the relation of affective tone to the saturation of the color. Although the experimental work of Major cast some doubt on the work of Cohn, many investigators have tended to support the contentions of the latter that the more saturated a given color is the more pleasing is the effect. Washburn, for example, found that red ranked first when it was very well saturated, third when it was less saturated and darker, and eighth when it was less saturated and lighter. Since in practically all this work a large individual variability in the matter of likes and dislikes is manifest, it is not surprising to find that there are a few exceptions to this generalization. Since this factor of saturation appears so important, we can readily understand why some of the investigations on color preference yield such equivocal results.

For some time Cohn's principle, that combinations of color or gray are pleasanter the greater the difference in brightness between the components, has withstood dispute. Recently Metcalf found, to the contrary, that the majority of observers preferred relatively small degrees of contrast in the gray series of papers which he used. Combinations of gray with black or white were less preferred in general than fairly contiguous grays, and combinations of black with white were least preferred. There was also a marked influence of the background as compared with the center in determining the affective response to the combination.[1]

When it comes to the types of colors or hues that are preferred as compared with those that are disliked in varying degrees, there is a general tendency to rank the reddish purples, the reds, and the blues relatively high in affective value and the yellows and yellow oranges rather low. Using 7 different colors Geissler found that blue ranked highest among 61 men, while green ranked highest for 61 women and also for the 122 men and women combined. Orange was lowest for the 61 men and for the 122 men and women combined, while blue was lowest in rank for the 61 women, Yellow, however, never rose above the intermediate rank. Some interesting data have been compiled by Garth on the color preferences of full-blooded and mixed-blooded

[1] J. T Metcalf, The pleasantness of brightness combinations, *Amer. J. Psychol.*, 38, 1927, pp. 607–623.

American Indians as compared with white populations, establishing a rank order as follows:

	Rank	1	2	3	4	5	6	7
559	Full-bloods	red	blue	violet	green	orange	yellow	white
174	Mixed-bloods	blue	red	violet	white	green	orange	yellow
560	Whites	blue	green	red	violet	orange	yellow	white

The confusing factor here is the introduction of white, which is not a hue. All the differences in rank were definite among the full-blooded Indians except for white and yellow. Again we notice the preference for blue, green, and red, the last moving toward first place in the primitive races. Educational influences appear to have had no effect in this study and the preferences according to this investigator, on the whole, are 'stubbornly native.' The preferences were also more decided than for the white population.

Among a thousand white children from the first to the tenth grades, Garth discovered that the sequence of preferences was the same as that indicated above for the adult white population, namely, blue, green, red, violet, orange, yellow, and white. A marked difference occurs in the 'pulling' power, measured in terms of the scale value, between certain colors. Blue 'pulled' three times as hard as yellow, twice as hard as orange or violet, and one and two-thirds as hard as red or green. The judgment was more decisive in the case of the boys than in the case of the girls. Educational influences seem to play a part in changing the preferences for all colors, excepting blue, but most decidedly in the case of red, which holds the highest rank with blue in the lowest grade of school and next to the lowest rank in the highest grade. This curious shift may have some bearing on the interpretation of results for the native Indians. In a later study Garth gave the color preference for a number of races whose school-children in grades one to ten were studied:

	Blue	Red	Green	Violet	Orange	Yellow	White
White	0 27	0 18	0 19	0 13	0 14	0 09	0 00
Negro	0 29	0 13	0 15	0 15	0 16	0 10	0 01
Indian	0 20	0 26	0 15	0 19	0 14	0 07	0 00
Filipino	0 17	0 25	0 15	0 15	0 09	0 04	0 15
Japanese	0 22	0 22	0 16	0 15	0 07	0 12	0 05
Mexican	0 16	0 29	0 29	0 09	0 07	0 02	0.08
Averages	0.22	0 22	0 18	0 14	0.11	0 07	0.05

In brief we remark again the relatively low rank of yellow, even among primitive and foreign peoples, where the verbal associations can not be the causative factor, as in our own language, and the high rank of blue. The outstanding difference is the high rank which red holds among other than white and negro populations of children, giving *blue* a tie with *red* for first place in the totals with green a close second.[1] Mercer has given us figures for 1,006 adult negroes with frequencies and ranks for each of seven stimuli. His data are presented in frequencies as related to the seven possible rankings. Red, for example, was given first place 134 times, blue 346 times, *etc.* These colors were given seventh place 181 and 49 times respectively. Multiplying the first two figures by 7 for first place and the last two figures by 1 for seventh place, produces the following weighted relationship:

Blue	Orange	Green	Violet	Red	Yellow	White
865	680	670	658	619	604	419

Conversion of these weighted frequencies into percentages gives the following:

Blue	Orange	Green	Violet	Red	Yellow	White
0.19	0 15	0.15	0.15	0 14	0 13	0.09

Noticeable is the fact that this special study confirms the order found by Garth even though the calculations and weightings may have slightly altered the original values. As before, blue holds its first place in rank while yellow and white foot the list. Orange, which is usually associated in rank with yellow, moves up to the second place with green and violet, as in the Garth study of negro children.[2]

Guilford and his colleagues have recently published a number of studies on color preferences and on the affective responses to combinations of odors.[3] A valuable summary of experiments conducted for a period of fourteen years with only slight variations in technique shows a rather consistent series of results. Yellow and orange occupy a low position in the fluctuating graphs for both sexes while red and blue generally have the upper position and green lies close to the point of indifference. The two sexes, however, differ consistently from year to year. Men usually preferred orange to yellow while the reverse was true for the women. There is also a gradual shift for some

[1] T. R. Garth, The color preferences of 559 full-blood Indians, *J. Exper. Psychol.*, 5, 1922, pp. 392–418; A color preference for 1000 white children, *ibid.*, 7, 1924, pp. 233–241; *Race Psychology*, pp. 115–136, 1931.

[2] F. M. Mercer, The color preferences of 1006 negroes, *J. Comp. Psychol.*, 5, 1925, pp. 109–146.

[3] W. Spence and J. P. Guilford, The affective value of combinations of odors, *Amer. J. Psychol.*, 45, 1933, pp. 495–501.

of the colors, notably red, which fell from its high position of preference, became uncertain for a time, and recently appears again to rise. Women showed more fluctuations from year to year than did men.[1] The affective value of color has also been investigated as a function of hue, tint, and chroma and as a function of area.[2]

By way of review it is clear that, as compared with yellow, blue generally ranks high in the populations of many races and that the preference for red seems to be submerged under the influence of civilization and education. The crucial experiment, however, still needs to be done. The writer suggests that translucent colored gelatins of fairly large area, say 20 cm. sq., be exposed under the technique of single stimuli with backgrounds of black, white, and medium gray. The colors should be the six colors named above and should be identifiable in terms of some standardized set like the Milton-Bradley series. Lighting conditions, both behind the gelatins and in front of the exposure, should be controlled for the entire series. A rating scale of seven values from $+3$ to -3 should preferably be used. Even under the best of conditions the inherent darkness of blue, from the point of view of brilliance, with the three backgrounds which would thus be unequal for all the colors presented, presents a difficult but not insuperable problem. With such a well-controlled set of conditions the problem of sex, age, and racial differences could be attacked. Individual variations would still be present. Some investigators have pointed out, nevertheless, that, when these variations occur, they are persistent, at least for a period of several months. Another incidental error that complicates the picture in the affective responses to colored stimuli is derived from the fact that temporary fads and fashions in the use of color for clothing occur. For some seasons of the year or for certain years, prevalent colors are used and, when brought out in distinctive shades, often attract favorable notice. This might influence the female sex of the population more than it would the male. Beyond this there is always the problem of meaning. The abstract qualitative aspect of color, aside from its objective relation to cloth, paper, wall tint, and the like, though encouraged by instructing the observer to respond quickly, thus minimizing verbal or other associations, and by telling him to attend to that particular experimental distinction, is still an

[1] W. Walton, R. B. and J. P. Guilford, Color preferences of 1279 university students, *Amer. J. Psychol.*, 45, 1933, pp. 322–328.

[2] J. P. Guilford, The affective value of color as a function of hue, tint, and chroma, *J. Exper. Psychol.*, 17, 1934, No. 3, pp. 342–370; B. H. Marshall and J. P. Guilford, The dependence of hue, tint and chroma upon area, *Amer. J. Psychol.*, 56, 1934, pp. 465–474.

elusive value. The attributed meaning may in many cases account for sex, age, and racial differences and can hardly be avoided.[1] It is claimed, for example, that girls usually rank colors in the preferential order of red, green, violet; and that boys rank them in the order of blue, yellow, orange. Adults are said to rank them in the order of blue, red, green, yellow; but after forty years of age yellows may be preferred to greens.[2] How actual application can radically change the situation is ably portrayed by Poffenberger in the preferential selection of color combinations in the presentation of useful institutions, articles, and materials from the point of view of advertising matter.[3]

As an indication of what may be done with odors in the form of affective stimuli, Young reported on the constancy of affective judgment to odors. In one series of experiments he used eight odors chosen so that four of them were expected to be pleasant and four of them unpleasant. Two men and two women were used as observers and the series lasted five weeks. The scale of values technique was used. The results showed a remarkable constancy in the intensity of affective response for some of the odors. Variations, when they occurred, were greatest in the region of indifference, but the more intensely pleasant and unpleasant odors maintained their extreme position. This agrees very well with similar work done on colors by Washburn and Gross,[4] who found that the "extreme judgments are harder to change voluntarily than moderate judgments." Both the quality and intensity of the affective response may vary, nevertheless, even during the period of stimulation; the judgment may also remain constant for several successive days and then abruptly change. In a later study Young repeated this study with thirty-two chemically pure organic substances under much more favorable conditions. Altogether nineteen observers were used over a period of twelve successive days and the technique was expanded to include eleven degrees of

[1] G. J. von Allesch, Die aesthetische Erscheinungsweise der Farben, *Psychol. Forsch.*, 6, 1925, pp. 1–91, 215–281.

[2] R. M. Dorcus, Color preferences and color associations, *Ped. Sem.*, 33, 1926, pp. 399–434; B. Hirohasi, Some experiments on beauty of color, *Jap. J. Psychol.*, 1, 1926, pp. 406–432; M. Imada, Color preferences of school children, *Jap. J. Psychol.*, 1, 1926, pp. 1–21; F. Miziguchi and S. Aoki, Color preferences in adults, *Jap. J. Psychol.*, 1, 1926, pp. 22–33. For a detailed summary and useful chart of color preferences *v.* A. R. Chandler, Recent experiments on visual aesthetics, *Psychol. Bull.*, 25, 1928, pp. 720–732.

[3] A. T. Poffenberger, *Psychology in Advertising*, Chap. XVII, 1925.

[4] M. F. Washburn and S. L. Gross, Voluntary control of likes and dislikes; the effect of an attempt voluntarily to change the affective value of colors, *Amer. J. Psychol.*, 32, 1921, pp. 284–290.

affective response. Even though the method is not ideal, Young believes that the statistical constancy of affective judgment demonstrated by this more carefully controlled experiment is theoretically important.

Young proceeded to interpret the scale of values technique in the light of this and other experimental data.[1] The constancy of judgment, especially in the extreme positions for a relatively short period of time, at least for a period of several months, is an outstanding fact. Yokoyama's conclusions included a statement that "the preferential orders of colors and forms are relatively permanent during a period extending over five months." Beebe-Center in reviewing a large number of experiments in both color and sound came to the general conclusion that "the hedonic judgments of a single individual vary little over periods of time as long as a year." Since many studies have shown a change in affective judgment in individuals at various periods of school education from the kindergarten through college and in children as compared with adults, variations must occur over longer periods of time. This matter will be again discussed when we are dealing with the affective development of the child. In the case of odors, however, a comparatively longer period of constancy seems to obtain than in the case of color. Henning, indeed, seems to have been right in asserting a fairly permanent correlation. Fragrant, ethereal, spicy, and resinous odors are usually judged to be pleasant while putrid and burnt odors are generally unpleasant.

In the case of auditory stimuli, we have already stressed the complications of the problem. In the judgment of consonance and dissonance, it is difficult to maintain either a cognitive or an affective attitude *per se*. Besides, as Heinlein has pointed out in the case of major and minor modes, training has a deep-seated influence in the way we judge such musical effects. Both trained and untrained observers may react to minor passages as 'bright,' 'happy,' 'cheerful,' 'joyful,' and even 'exuberant.' Major passages, on the other hand, may elicit affective responses of 'gloomy,' 'plaintive,' 'melancholy,' and even 'mournful.' Obviously, while the mode may exert a contributing influence in a certain direction, other factors, such as tempo and thematic phrasing, may also be operative.[2] Farnsworth has shown how strong the habit effect and mere repetition may be in changing

[1] P. T. Young, Constancy of affective judgment to odors, *J. Exper. Psychol.*, 6, 1923, pp. 182–191; Studies in affective psychology, VIII: The scale of values method, *Amer. J. Psychol.*, 42, 1930, pp. 17–37.

[2] C. P. Heinlein, The affective characters of the major and minor modes in music, *J. Comp. Psychol.*, 8, 1928, pp. 101–142.

preferences for melodic endings and other atonic effects. To some extent this accounts for the original inertia and the later gradual appreciation of the changes introduced by the modern Debussy and the ultramodern Schoenberg.[1]

Taking just the opposite mental attitude from that usually required in such tests as the Seashore test of consonance Valentine's subjects found that the musical intervals received the following scores on a scale of values extending from +2, +1, +0.5 and 0 to −0.5, −1, and −2:

Maj. 3d	324	Tritone	153
Min. 3d	261	Perf 5th	139 5
Octave	246 5	Maj. 2d	− 99
Maj. 6th	243	Min. 7th	−162
Min. 6th	214	Maj. 7th	−316
Perf. 4th	157 5	Min. 2d	−368

Slight shifts in this rank order—but not in the extremes, nor of more than two ranks—were found when the votes of the 62 men were separated from those of the 84 women observers.[2] The situation is obviously a complex one because of the difficulty of maintaining a constant attitude, as Pratt has discovered among his observers in a similar experiment. Some persons are impressed with the musical meanings of the intervals while others judge smoothness and roughness as a basis for the affective response.[3] None of the observers based their affective judgments upon pleasantness and unpleasantness *per se*. This accounted for many shifts in the position of the various intervals when the mental attitudes were changed. It also accounts for the lack of uniformity in the rank orders of intervals that appear in the literature.[4]

From the foregoing account we see that the results obtained with tones, especially with combinations of tones, are not nearly so unequivocal as are the facts derived from the visual and olfactory sense departments. There has been more intensive work done in the latter sensory modalities, it is true, but the pressure from the side of musical aesthetics is admittedly very great. On the other hand, just because the aesthetics of tone has had such a long and highly intensified development, probably it is not so easy to assume an analytical attitude toward it.

[1] P. R. Farnsworth, Atonic endings in melodies, *Amer. J. Psychol.*, 36, 1925, pp. 394–400; The effect of repetition on ending preferences in melodies, *ibid.*, 37, 1926, pp. 116–122; Ending preferences in two musical situations, *ibid.*, 37, 1926, pp. 237–240.

[2] C. W. Valentine, The aesthetic appreciation of musical intervals among school children and adults, *Brit. J. Psychol.*, 6, 1913, pp. 190–216.

[3] C. C. Pratt, Some qualitative aspects of bitonal complexes, *Amer. J. Psychol.*, 32, 1921, pp. 490–515.

[4] C. E. Seashore, *Psychology of Musical Talent*, p. 147, 1919.

Tradition weighs heavily on the various effects produced. In a sense the musical art is sufficient unto itself. Science is, nevertheless, interested in making discoveries of fact in this realm. But in the realm of feeling, many obstacles must naturally first be overcome.

4. Summary.—In the other sensory modalities, like those of taste and of touch, some experimental results are also at hand which relate to the affective responses of individuals. The above examples must suffice, however, to show what can be done with the procedure of impression. We have seen its historical development and modification in the way of improved refinement. Almost all the variations which have been proposed and used have been applied to Fechner's *technique of choice.* The tendency today is to use the technique of single exposures with a method of judgment based on a scale of values, usually of seven gradations. The most fertile use of this technique, quantitatively speaking, has been in the field of color. While still much needs to be done, we are in a fair way toward determining the most preferred colors among individuals of both sexes, of different ages, and of different races. The problem of nature *vs.* nurture is also being attacked. It is clear that in an adult white population blue holds high rank and yellow a low rank. The low contrast effect of the latter however, on a white background, may have something to do with its low affective position. In the case of odors, more constancy appears in the affective judgment, probably due to a longer natural influence and less of an environmental change through training. That this training can affect the behavior of individuals can easily be noticed in hospital practice or in the experience of medical men engaged in making post-mortem examinations. In any event, the laws of adaptation come to the rescue, but even when allowance is made for such phenomena, the affective response is still encountered and that response undoubtedly undergoes decided changes.

Many problems in this sector of experimental work had to be omitted or postponed in our discussion. Our aim was to present some of the outstanding materials as examples of the kind of work that can be done with the procedure of impression. Though the procedure is an indirect approach, through the principle that affective processes are invariably attached to other mental processes which can be directly reported, promising facts are emerging. The difficulty comes from the inherent nature of the procedure and its implied principle. The mental attitudes of the observer may vary unless the instructions are strictly followed. The effect of this change in attitude was perhaps best illustrated in the experiments on tonal intervals, where divergent results followed. From this point of quantitative analysis

we pass on to a cognate area, that of qualitative analysis of the various feelings, especially of the more complex emotional type.

Review Questions

1. Describe a typical experiment illustrating the procedure of impression.
2. What is the fundamental need for the use of the procedure of impression and upon what basic assumption does the procedure rest?
3. State the relationship between the affective response of a combination of colors and that of each of the component parts.
4. Outline the criticism against the assumption that in the technique of paired comparisons the calculated frequency is an absolute value.
5. Illustrate the Beebe-Center law of affective equilibrium.
6. Give an instance of the relation of hue to saturation in affective responses
7. Discuss the difficulties attending affective responses to musical intervals.
8. Indicate the shift in the rank of red with educational progress.
9. Compare the advantages and disadvantages of the technique of paired comparisons with those of the technique of order of merit.
10. Set up an experiment approaching ideal conditions for the affective ranking of six odors among children of the tenth grade.

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CHAPTER XIII

QUALITATIVE DESCRIPTIONS OF FEELING AND EMOTION

As there are three parts in every emotional system, so we must distinguish in Fear, first, that part which is present in consciousness and accessible to internal observation—the emotion itself, its impulses, sensations, and thoughts; secondly, that part which is organized in the nervous system or in subconsciousness, comprising the instincts of fear and its acquired dispositions; thirdly, that part which comprises the characteristic behaviour of the system, and is accessible to external observation.

A. F. Shand, *The Foundations of Character.*

1. The Description of Feeling and Emotion.—In the above quotation from one of the best analytical and systematic accounts of the feelings of man, the threefold possibilities of obtaining facts concerning the affective life are concisely put. With the last two modes of attack we have dealt first, and in inverse order. Owing to the fact that the outward expressions of emotion, especially as regards the face, were most easily accessible and were soon noticed, the earliest descriptions of emotions and feelings recorded in the literature were written largely in terms of these external evidences of feeling. Through the work of Darwin this led to the classical treatise which compared the facial expressions of man with those of the lower animals. With the James-Lange-Sergi theory, attention was directed to neurological studies and then to other bodily manifestations. Now we are beginning to realize the dearth of material including qualitative descriptions of these mental processes. The problem of analytically reporting on the affective processes, whether they be simple or complex, is not easy. In the more elementary phases feelings lack attributive clearness, an essential feature of the introspective method. For this reason special techniques under the procedure of impression have been devised. The expressive procedure assumes as its basic premise the correlation of mental processes with bodily changes of many sorts. This procedure has also enjoyed much application and refinement as apparatus and specialized techniques were gradually invented and improved. In both of these indirect approaches, the procedures of impression and expression, an increasing emphasis has been placed on the truly mental side of the picture. In the impressive procedures the question of meaning, of interpretation of instructions, and of mental attitudes has increasingly

upset a straightforward quantitative analysis of data. Also in the case of the procedure of expression, with its manifold technical approaches to the physiology of the body, the question is persistently and sometimes quite insistently raised as to what was the actual *experience* of the subject of the experiment. What did he fear? If he manifested the explicit signs of fear, as in the administration of adrenalin, did he really experience fear or fright, or rage? In the case of the lower animals and of infants an answer to this question will never be directly forthcoming; strong and well-supported inferences can only be directed toward this problem from the angle of analyzing actual human experiences of emotions under somewhat similar conditions as are present in the case of these animals and very young children.

If the inherent nature of simple feeling makes a frontal attack difficult or impossible, then the more complex sense-feelings, emotions, moods, passions, and sentiments still further resist the clear-cut analysis demanded by introspective techniques. For these latter processes are not only much more complex in texture and function, but they are by all odds the most overwhelming and consuming processes in the mental life, especially when they are experienced at their fullest intensities. Suppose you find someone enraged, 'mad clear through,' or deeply embedded in sorrow, what is the likelihood of a scientific analysis and scrutiny on the part of such an individual while the experience is under way? Let us take an example. An old farmer has been asked to store in a trunk in the basement a very precious pitcher, an almost priceless heirloom long treasured in the family. As he goes down the stairs he holds the pitcher firmly in his hands. Nervously he slips near the top of the stairs, but as he tumbles down he clasps both arms about the pitcher and huddles his body around it. His wife hears the clatter and, running to the door leading to the stairs, sees the form of her husband much battered and bruised at the bottom of the steps. "What! Have you broken the pitcher?" she exlaims. In wrathful disgust and fury at her utter unconcern for his own welfare, he shouts back, "No! But, by golly, I *will*!" and smashes the pitcher on the cement floor. Ask that man to make a careful report of his sensations, ideas, and feelings, if you dare!

Confronted by such obstacles as these, the reader may wonder why we ever started to write a chapter on "qualitative descriptions of feeling and emotion." The task seems insuperable. For the scientist nothing is finally insuperable! The work may take a long time; it may be tedious and almost forbidding, but never insuperable. Just as "faint heart never won fair lady" so daunted intellect never scaled Olympus. All sciences know how problems which appeared to be insuperable at one time finally surrendered their secrets after persistent research, even after some of the greatest minds, like the celebrated physicist,

Rowland, are reputed to have said in effect, "After my work nothing more will be known about the problem." So the psychologist faces the problem of the higher mental processes, those that are most refractory and complex because they stand at or near the end of the mental life as it has been evolved from whole to part. Originally the whole was fairly simple; it could do all that was required of it at that level of life and do it fairly simply. While the parts took over specific functions and thus became much more specialized in function, they also became not only complex mechanisms, but they grew to be mutually interrelated. Affiliations sprang up on all sides from both the mental and the physiological aspects, betraying thus the original ancestry of the parts in terms of the whole. Thus the emotions and the feelings, especially of the higher types, have become interconnected with many other mental processes: sensations, imagery, perceptions, ideas, motor responses of all kinds, memorial functions, imagination, and even the highest intellectual activities come under their influence.

But by and large, such complications are not at all new in an analogous way in the other sciences. An advanced student of zoology, botany, geology, astronomy, physics, and chemistry, to say nothing of such close neighbors to psychology as physiology, neurology, and anatomy, well knows the intricacy of the questions that there press for answer. But a student in these sciences might say, "We have objective methods, while your method is highly subjective and one that affects the very processes which it aims to analyze." As James picturesquely put it, "The attempt at introspective analysis in these cases is in fact like seizing a spinning top to catch its motion, or trying to turn up the gas quickly enough to see how the darkness looks."[1] This criticism is one of many that have been made against introspection. Aristotle realized it and answered it; so did James. We are not here concerned with a critique of the method as a whole, but only as applied to the analysis of emotion and feeling.[2] We have seen how in the case of the simple feelings special procedures have been devised to overcome inherent difficulties. Now we must face the issue squarely and decide whether or not the emotions, for example, can be analyzed by means of the method of introspection.

[1] *Principles of Psychology*, Vol. I, p. 244, 1890.

[2] It is presumed that the student has dealt with this methodological problem in psychology before. For those who are not so well acquainted with it, the following references may be helpful: R. Dodge, The theory and limitations of introspection, *Amer. J. Psychol.*, 23, 1912, pp. 214–229; E. B. Titchener, Prolegomena to a study of introspection, *ibid.*, pp. 427–448, the schema of introspection, *ibid.*, pp. 485–508; J. B. Watson, Psychology as the behaviorist views it, *Psychol. Rev.*, 20, 1913, pp. 158–177; E. B. Titchener, On "Psychology as the behaviorist views it," *Proc. Amer. Philos. Soc.*, 53, 1914, No. 213, pp. 1–17.

Before we can answer this question, it would be well to understand just what the introspective method demands in this special case.

2. The Introspective Method as Applied to Feeling and Emotion.—The term 'introspection' has been much misunderstood. Chiefly two wrong conceptions have for a long time held sway: (1) that, as the Latin derivation suggests, there is some more or less mysterious 'looking within,' a turning of the mind inward toward itself often in a morbid way, and (2) that long initiation and special mental agility must be developed to accomplish this acrobatic feat. As in so many false notions, there is a minimum of truth embedded in these presumptions, but, as a description of the essential method of psychology, the implications are for the most part distorted.

Let us take the matter of 'looking within.' In the everyday life of most animals that have developed what are known as exteroceptors, or sensory organs adapted to receive energy from sources outside the organism, when stimulation occurs, the conscious reference is normally to an object, situation, or event outside the body. This is least true of the skin, since that portion of our body probably was the earliest to develop the exteroceptive type of mechanism. Even the eye was at first a pigment spot on the skin, as over against sensory organs or mechanisms which consciously reflected the condition of the body itself. The whole problem of egocentric projection, as in the case of a walking cane or a baton, to say nothing of numerous other physical objects like artificial limbs, false teeth, and the like, is an exceedingly interesting one. We should recall that even a negative after-image, which is at most only a physiological effect on the retina of the eye without outside background, is projected toward a physical background and is thus objectified. All this projection is a necessary means of adjusting the organism to an outside environment and is enhanced through motor responses as they become coordinated or integrated with the sensory stimuli. With this process, a definite ascription or assignment of the experiences thus felt to outside objects follows as a matter of course. The sky is blue, the table is hard, the lemonade is sour. Under the usual conditions, therefore, our own experiences are presumed to lie elsewhere and to take on a physical or natural orientation, or set of dimensions in physical space and time. That is 'looking without.'

Coupled with this tacit assumption is the corollary that if the mind 'exists' at all, it also must have dimensions in physical space and time and that the most convenient place for it is within the body, either as its permanent or temporary residence. Various allocations have been historically

suggested. Since injuries to the head or brain usually resulted in loss of conscious experience or otherwise affected the mind and since increasing knowledge of bodily mechanisms, especially of the central nervous system, pointed to the brain and particularly to the cerebral cortex, consciousness was readily allocated to or correlated with the brain or with some specialized structure within the brain. Hence came a 'looking within,' when the problem required a report of experience. Several writers are trying to get away from that connotation and are pointing out the identity of the psychological method with the methods of other empirical sciences, only the material reported is considered from a different point of view. Terms like 'inspection' and 'direct observation' are therefore gradually replacing 'introspection' and self-observation.'

Lest we be accused of simply shifting the *problem* to the *point of view*, let us proceed at once to say that here lies the very crux of the question. It is a different point of view. That experience is a reality of the world, no one, not even Watson, the protagonist of behaviorism, can readily deny. Watson, for that matter, has admitted it as a subject for discussion in philosophy, but not in his conception of psychology. All that introspection demands is that the red seen as a part of the American flag be scrutinized as a quality of red—its 'redness' is reported quite apart from its belonging as a necessary ingredient in the national emblem. If one line is seen as being longer than another, one tone is heard as being higher in pitch than another tone, the judgment thus expressed, if accepted as valid, when suitable conditions have been established, is nothing more or less than an introspection. The experience is reported as experience and the reference to an outside object having such characteristics is for the moment neglected.

No question then should arise about the mind 'turning inward' in any morbid or other sense of the phrase. As a matter of fact the impersonal aspect of the event, the disinterested and unattached way in which such reports are made, cancel all implications either of an inward turning or of morbidity. Continued self-analysis from the point of view of self-interest is not introspection but introversion. But soon another question is rightly raised. Does this type of observation require long initiation and careful training? A tentative answer has already been made. Some forms of observation are exceedingly easy. The report concerning the color of a negative after-image, the statement as to whether one or two points are felt on the skin, the declaration of preferences among odors, all these are relatively simple matters. With suitable checks and controls, valid and consistent accounts are obtainable from relatively untrained observers. In the case of imagery, difficulties begin to appear because unless the observer

is on his guard, vocimotor adjustments, as in humming a tune, may be mistaken for clear auditory imagery. With the more complex problems of attention and emotion, of memory and creative imagination, of musical enjoyment and deliberative thinking, a period of training and progressively reliable results as the experiment goes on are the order of the day.

Here again psychological observation is not essentially at variance with observation in other sciences as to degrees of difficulty. It takes considerable training to see correctly the various histological forms that are magnified under the microscope. A talented artist was inquiring about a position in a department of zoology at this university. Almost the first question put to this artist was how many courses in zoology she had taken. The professor in charge pointed out that a camera could probably take a more accurate picture than the artist could draw. But the camera could not make the picture look the way that a practiced eye saw it under the microscope. Even the exceptionally fine photographs taken of trenchworks and of the disposition of enemy equipment during the World War often needed an expert eye to interpret the objects sought after. So it is in psychology and so it is in some limited area like that of feeling and emotion, where the experiences to be reported may be as complicated in their way as are the higher organic compounds in chemistry. There are several features about introspection or the direct observation of experience which somewhat reduce the difficulty. One is the gradual acquisition of a technical language and of the concepts which that language symbolizes. The excellent dictionary which has recently appeared ought to go even farther than our textbooks to standardize the current usage of words in the scientific description of experience.[1] Not only the use of descriptive terms, but even the practice of mental analysis, improve with time. The writer was present, years ago, at a conference of eminent psychologists, several of whom admitted that they were able to take note of experiences even when they believed that they had been, on one occasion, facing death. The habit of mental note-taking in an impersonal way, but not, of course, continuously and on every occasion, helps to make the task much easier. This process will be better understood if we formulate as briefly as we can some description of the introspective method, or the method of direct observation of experience.

3. A Formulation of the Introspective Method.—If we are called upon to describe in a few sentences the introspective method as it is applied to this particular area, we should emphasize three essential features. These features may take on the characteristics of goals which may be ideally approached, but all of which may, in any given case, never be actually reached. The first feature is one of attentive regard of experience. Experience must not be just casually lived.

[1] H. C. Warren (ed.), *Dictionary of Psychology*, 1934.

One must be alert to catch whatever is there. This may be carried as a kind of latent instruction or *Aufgabe*—the very thing that occurs when practice has already been attained and when the process of envisaging experience has become a habit. The second feature is an attempt to face the experience analytically and cognitively—not as an immediately given experience with all the earmarks of the everyday world upon it, but critically and inquiringly. The attitudes of the workshop, the factory, the schoolroom, the street are usually those of appraisal and of appreciation. We need instead the attitude of scientific scrutiny and identification. This leads us directly to the third feature, the use of a scientific terminology. The categories of the textbook on psychology must now be applied and the analysis must be couched in the terms and phrases of scientific diction. Put in such manner, the requirement here made takes on a much stiffer formality than is actually the case. For with a little practice, again, visual imagery, kinaesthetic sensations, verbal ideas, and the like fairly obtrude themselves upon the observer's attention—experiences come already clothed with the technical labels upon them. Thus the last two features set forth above are merged into one. Instead of saying, "I thought of the time when I was in a similar predicament," the observer tells whether the imagery referring to this time was a verbal idea, kinaesthetically initiated in the region of the throat, or a complex visual image, colored or uncolored, distinct or hazy, *etc.* The scientific attitude and the required terminology are complementary one to another.

We are now prepared to give a formulation to the introspective method. *It is the attentive analysis of experience stated preferably in the scientific terminology of psychology.*[1] Titchener succinctly states that definition in somewhat the same fashion, but substitutes the term *observation* for the traditional word introspection.

"An observation implies three things: a certain attitude towards phenomena, a vivid experience of the particular phenomenon which is the object of observation, and an adequate report of this experience in words. The relation of these three things will be clear if we write a formula for observation, thus:

Psychological (vivid experience ⟶ full report)."

Later he distinguishes *introspection* from *inspection*, giving for the former the *psychological* attitude, namely, that of exploring the world with *man left in*, and for the latter the *physical* attitude, which is that

[1] C. A. Ruckmick, *The Mental Life*, 1928, pp. 9–10.

of exploring the world with *man left out.* These attitudes modify the entire parenthesis in each case. The report, he stipulates, must be framed in psychological language. Quoting Huxley as saying "there is not one person in a hundred who can describe the commonest occurrence with even an approach to accuracy" he specifies technical training for the psychological observer chiefly because, using Lewis Carroll's phrase, the essence of experience is *processence.* Experience is essentially fleeting, ongoing, proceeding. Also common sense hampers us in that we are so much of the day in an evaluative and appraising as opposed to a scientific attitude of mind. Was it not also Huxley who remarked that he *knew* that the earth was coming up to meet the sun at sundown, but that he *liked* to regard the event as a sunset.[1]

One point, furthermore, needs clarification. Provided we have trained our observers, both in general laboratory work, where they have faced and met the problems of controlled experimentation, and in the special area of observing their feelings and emotions, there is still left the handicap that feelings, especially emotions, sway and overwhelm the entire consciousness. If affections lack the attribute of clearness and are vague, emotions contrariwise are exceedingly clear and definite. But they usurp the whole field and leave no room, as it were, for calm analysis. Training may go a long way toward rectifying this situation, but often recourse has been had through the use of a handmaid of introspection, called retrospection. Angell has interpreted all introspection as retrospection:

"But it is an undeniable fact that by means of memory we are made aware of our mental acts, and we can trace in this manner by careful and systematic observation many of the rudimentary facts and principles peculiar to human consciousness."[2]

In a later book he makes this point clearer:

"Suffice it to say that direct observation of the kind described, *i.e.*, of mental experiences just past, is a commonplace of everyday life, and that, carried out carefully and systematically by many individuals, it has resulted in the accumulation of a very respectable body of knowledge entirely worthy of the term scientific."[3]

The interpretation made by Angell is, in the main, correct. If emphasis is placed in observation on the report, the report usually comes after the experience observed is past, or at least while it is under

[1] E. B. Titchener, *A Beginner's Psychology*, pp. 18–22, 1915.
[2] J. R. Angell, *Psychology*, p. 5, 1908.
[3] J. R. Angell, *An Introduction to Psychology*, pp. 3–4, 1918.

way. In some instances, like the report of the color of a negative after-image, the report can be made simultaneously with the experience. If emphasis is given, however, to the attentive 'note-taking' of the experience as it runs its course, such as mentally saying, "There's a visual image," "Strain sensations across shoulders," then would follow the report given to the experimenter and based upon memory cues that were aided by the mental notations such as those mentioned. Many of the reports on emotional experiences follow this course.

A surprising result, based on many years of work with observers of all kinds, is that the best observers do not always come from the most thoroughly grounded students of psychology. With a few weeks of training it is often possible to get better objective and detailed accounts of experience from students at the freshman and sophomore level who have had little or no systematic instruction in the subject. They are sometimes more naïve and less reflective and they thus provide a check on the results obtained from more mature observers. Naturally such instances are rare, but they are remarkable. Certainly an individual difference is apparent in the ability of persons to scrutinize mental processes as they come and go. Pity it is that the term 'introspective' has been given such a bad odor by novelists, so that we can not apply it to persons who demonstrate this marked ability to analyze mental phenomena.

4. Some Results Obtained by Qualitative Descriptions of Feeling and Emotion.—While formal definitions and descriptive statement concerning the method employed from this angle of investigation are necessary and important, nothing can quite take the place of a demonstration of the method in actual operation. Short of supervising a series of experimentally produced situations involving emotional experiences in the laboratory in the rôle of the investigator on the scene of action, few materials are as illustrative of the method as are the introspective accounts themselves. Accordingly we shall proceed to give some descriptions of emotions and cognate feelings as they have been recorded in the protocols of the laboratory. Excerpts have already been published in connection with researches made under the writer's direction; these will be referred to. Let us first, however, describe some of the situations which have aroused emotional disturbances in the laboratory or in connection with laboratory work.

One of the most difficult emotions to produce under laboratory conditions is that of joy. In fact the extremely pleasant emotions are a rare occurrence in the laboratory under any circumstances that can be devised. It is much easier to arrange conditions for the production of intensely unpleasant emotions in the environment of the laboratory. This fact has been mentioned by a number of investigators. Situations

which can be expected to bring about such strongly pleasant emotions must therefore be anticipated as well as possible and provisions made for a report when the incident occurs. Such an arrangement was made with a student while the writer was on the staff at Wellesley College. In this case the writer anticipated that the student, who had had a year's training in introspective analysis, would be elected to Phi Beta Kappa, the honorary scholastic society. He told her that he might have an important message to give her over the telephone and that, if this should happen, she should be prepared to note down her experiences. He then arranged with the officers of the local chapter to withhold the formal notification until after he had completed his telephone call to the student so to be honored. This was agreed upon with the following result:

I. "I received a telephone call and was told of my election to Phi Beta Kappa.

My mind seemed to be a 'blank,' that is, there seemed to be no ideas present, at least at first. Then there were kinaesthetic and organic sensations in head as blood seemed to rush to head. I was hot all over and hands were moist—great emotion of joy. Organic sensations in chest, breathed fast, then it seemed as though I must say something to somebody. Want to 'burst' with such an emotion of joy and as always, I couldn't keep it to myself. Head became cooler and I tried to reason with myself in terms of snatchy verbal ideas to see that I must calm down a little. Left my hairdresser and felt so good that I wanted to run. Exhilaration and still also joy."

II. "Met two girls in hallways who knew about my election. I was so glad to be able to talk to someone. It seemed almost as though I should weep—literally 'weep with joy.' Ideas a little confused and almost forgot to say anything. Then I asked about my friends. Organic sensations in abdomen, chest, and head due to feeling so good that all was tight and strained. Later there was relaxation and a completely worn-out feeling."

Here we have a typical picture, perhaps not so complete as one might wish, since a more highly trained observer might have used more technical language. There may have been some omissions, but considering the fact that the joy was apparently real and extreme in intensity, the experimenter felt grateful for what he got. In some other typical instances of a similar nature, many of the characteristics mentioned were repeated: the temporary inhibition of ideas, the sensations of warmth in the head, the kinaesthetic strain sensations in the head and later in the abdomen, the tendency to some motor expressions —all were repeated in other individuals under six situations of like kind.

A somewhat similar situation but milder in form, because the award of membership in this honorary society was anticipated, brought from another observer the following account with many of the same features enumerated:

"Extremely pleasant surprise. Feeling of lightness, seemingly due to certain pressures in chest—that is, the wall of the chest seemed to be pushing out. Cheeks became hot, while hands were cold and clammy. There was a tightness in my throat. I had distinct visual images but they changed very rapidly: images of the 'Senate Room,' of newspaper notices—the whole situation of last night was reviewed in detail. The muscles of the face had a tendency to contract and I felt kinaesthetic sensations corresponding to those of smiling. Lower limbs became slightly numb as when first going to sleep. Auditory image of things said last night. The lightness gave a general feeling of elation."

In this account as in several others that have to be omitted for lack of space, again common elements occur. Tensions in chest, warmth in face, moist hand, and muscular sensations generally distributed are characteristic experiences, as are the pressure sensations in the chest region, the 'bursting' feeling which was, nevertheless, one of lightness and elation in its meaning. In the verbal description here given we find enough material to validate the experience as a true pleasure or joy. We can also find common elements that are fairly persistently and uniformly reported week after week, certainly in the same observer and to some extent by different observers. Many more of such descriptions will have to be available, however, before the classificatory names of the different kinds of emotions and feelings can be well grounded.

We shall now turn to a description of anger. Vigorous scolding and sarcastic derision were applied by the experimenter to an observer who was asked to answer a series of questions on psychological topics, many of which were purposely unduly searching without giving to the whole inquisition an aspect of futility (Fig. 49). As a rule the observer felt that the examination was fair but difficult. The statement which follows is typical of many analyses made in the laboratory of the feeling or emotion of anger:

"In the first series of questions I was angry at and disgusted with myself for not being able to answer more questions. But anger came with the threat of punishment (electrical) and with the slighting remarks made during the scolding, which I felt to be unjust. Strong desire to talk back and to fight back. Clenched my teeth, eyes were blinded with tears, muscles in my jaws were set firmly. All my body was tensed. My face became warm. No organic sensations appeared, however. Later this anger turned into defiance

and I stamped my foot, saying 'no!' This shift between anger and defiance seemed to come when I felt that I had control over what I did, rather than *E*. It turned into anger again when *E* seized me roughly and commanded me to obey. My imagery all through the experiment was confused and vague—there were no clear images of any kind. Distinct motor sensations in vocal organs—on account of repression of speech."



FIG. 49.—The scolding technique. Used in the laboratory to produce anger or indignation.

In another case of vigorous scolding as the result of mistakes made regarding answers to questions on general and psychological topics, we obtained the following report:

"Dry lips and dry throat with excited feeling in diaphragm. Tension in hands and feet; pain in forehead and in the region of glands at side of neck. When anger came, remarks did not hurt. There was trembling in arms and legs and warmth all over body."

Another observer gave the following account in the same situation:

"Plenty of saliva. I swallowed constantly. Rapid breathing and pounding of heart. Abdominal muscles tense and trembling. Sweating

in palms. There was not enough breath. Visual image of myself receiving the scolding. I wanted to cry but I could not. Felt very much ashamed and guilty. Angry at the situation and at myself. Scolding became more serious and impressive. Feeling of horror at pain (of electrical shock) which was threatened. Also feeling of embarrassment. I wanted to grip hold of something."

The following description shows how real and intense the experience was:

"Feeling of warmth arises in entire body. Biting of lips; rapid beating of heart; quivering in "pit of stomach." The warmth sensations give prickly feeling in face. Then quivering in arms. I dug nails into palms of hands. Breathing came faster. Perspiration felt in palms of hand and under knees; also soles of feet were moist. Face twitched as blood came up. So angry that I was ready to hit *E*."

With one more example of what may be called anger bordering on self-reproach and disgust, we must close this section:

"Half self-disgust: half anger at *E* for discovering my ignorance. Wondering in the form of verbal ideas how long the questions and the accompanying "ragging" were to continue. Mouth was dry; face was flushed. Biting in cheek with accompanying facial tensions. Actual electrical shock which was threatened would be a relief—all this in rapid verbal ideas, also—*E* looked so mean that *O* wondered what *E* would be likely to do in extreme anger."

In these excerpts it is obvious that an analysis of experience can be made even when the emotion described is very intense. The accuracy of the report is indicated by the uniformity with which the details are repeated from time to time under a given set of conditions when a similar emotion was described by an individual observer. The observer could not, of course, fabricate such a report out of the whole cloth of his imagination and maintain that consistency, nor could he, with other events inside and outside the laboratory intervening, remember the details with any marked degree of fidelity from time to time.

The analysis of the emotional experience on a thoroughgoing scientific basis has only just begun. To date we have in our laboratory files 73 accounts of disgust, 64 of surprise and startle, 45 of fear and dread, 36 of amusement, 21 of anger, 11 of joy, 9 of horror, 7 of embarrassment, and 132 miscellaneous classes, many of them unnamed as regards the principal emotion that was felt. A large number of accounts contain running comments concerning several different emotions which were successively, and sometimes repeatedly, experienced. Some

accounts are too brief or too incomplete to be of any value. What can be accomplished in this direction is shown in some of the published studies from our laboratory. In her study of fear Bayley gives a long list of affective responses other than fear which she obtained in her experimental series.[1] Some of these were brief descriptions. Patterson made a very careful qualitative study of surprise and startle.[2] She found a significant correspondence between the reported intensity of the emotion and the amount of the electrical deflection. Kinaesthetic sensations were most prominent and the most frequently reported.

Other sensory groups, which are often noted in experiences of fear, startle, and anger, are relatively rare in surprise: organic sensations, temperature sensations, such as paling and flushing, and tingling feelings. Furthermore, surprises have much more of an ideational component than do startles, which are often described as 'physical' with strong motor components. As we have noted in another connection, in terms of temporal pattern and ideational content, we can show a sort of systematic gradation of affective experiences from bodily or sensory startle, through sensory surprise, typical fear, dread, and apprehension to ideational surprise. On the basis of introspective evidence, therefore, a genetic development is suggested, with startle and fear heavily weighted by biological events: circumstances which threaten to upset the welfare of the body. As the anticipations, which come with ideational functions, appear, however, not the physical but the mental and social well-being of the individual is at stake in a distinctly attitudinal setting—or at least there is a disturbance in the way of a mental adjustment. Dread and apprehension are distinctly expectant: not what is immediately at hand but what is coming is significant. Of course some intellectual surprises, like the sudden turn of an anecdote or remark, may be extremely pleasant even when the adjustment is in error. To be taken 'off-guard' mentally is not always unpleasant. This sort of interpretation is borne out by the electrodermal responses, since they are admittedly much more extensive and intensive in connection with the so-called 'physical' emotions.

We have also made a detailed introspective analysis of the state of fatigue, not so much for its own sake as for its effect on the bodily responses which have been recorded by means of the electrodermal techniques. Typical accounts of the fatigued condition have already been published.[3] But for the purpose of illustrating what can be done introspectively in this area a few quotations are appended here.

[1] *Op. cit.*, pp. 28–31.

[2] E. Patterson, A qualitative and quantitative study of the emotion of surprise, *Psychol. Monog.*, 40, 1930, No. 1, pp. 100–104.

[3] C. A. Ruckmick, Emotions in terms of the galvanometric technique, *Brit. J Psychol.*, 21, 1930, p. 154.

1. "Very definite fatigue, especially when ordered to lift body from table. Very suddenly there was a general 'let-down' of kinaesthetic sensations. Feeling of vague depression. Ideas came even more slowly than before. I could hardly talk out loud. Depression was mingled with disgust that I could not physically go through with series. Some incipient verbalization to the effect that 'There would be no use going on with the other situations or with repetitions of previous stimuli and performances.' The entire series became not pleasant or unpleasant but indifferent. Attitude was more 'I don't care.' General feeling of warmth. Dryness in mouth. Feeling of laziness. Mental processes seemed slowed up. Utter disregard for what might happen next. Continued counting as fatiguing as any of the physical exercises or painful stimuli."

2. "Several times I said to myself (verbal ideas), 'I simply can not make one more move.' Also verbal ideas, with incipient kinaesthetic cues, com menting on my befuddled mental condition. I could not keep things straight and did not care. No ambition. Emotional state was quite unpleasant at first with a number of the painful stimuli and then drifted into indifference. Even the strain sensations about the body from the exercises seemed to become much less intense. Speech seemed to come more slowly and still does - with the noted lack of ideas. Quite definitely noticed but vague organic sensations inside of trunk. Exercises became tedious. Some quivering sensations at first and still a slight tremor in arms and legs."

3. "Felt noticeably drooping eyelids; it was hard to keep them open. Tendency to vocalize comments but found it hard to utter sounds. Felt 'logey.' Wondering in terms of incipient vocal kinaesthesis whether this is the end. Felt ashamed that arm no longer responded in the prescribed exercises. Full organic sensations both below and above diaphragm. Some of the pain sensations lasted over. Ideas of all sorts came more and more slowly: visualized train of railroad cars coming ever more slowly into station. Eyes shut during most of the experiment—then could hardly open them at the end. Mouth became drier toward end of series. Repeated tendency, which was inhibited through instruction, to reply to *E*'s 'cutting' remarks."

Before we comment on these reports, a few analyses of other emotional experiences may be illuminating. The observer was threatened with a severe criticism of his classroom work, which had become careless and highly inadequate, or for some other type of delinquency. Here are the results:

"My eyes shift from any direct gaze. My face is very hot. The emotion is distinctly one of *fear*. My lips are dry. The muscles in my back, especially across my shoulders, have a decided tendency to contract as in writhing. The muscles in the back of my neck are tense; my breath comes faster and I have a 'shrinking' sensation as well as a slight 'sinking' one. Little pain sensations seem to shoot through the region of my heart. My knees contract and draw close together. The muscles in my calves and toes are very tense,

as in bracing myself. I have a distinct 'empty' sensation in the pit of my stomach and a catch in my throat. Now and then my teeth clench together and my jaw muscles knot. I have visual images of *E* scolding and of myself with not a chance to talk back—and I have become indignant. My heart beats faster, while my hands, which are warm and clammy, are clenched."

Likewise, for humiliation with intermittent anger at the experimenter combined with self-pity and a decided feeling of ineffectuality, we obtained the following vivid description. The observer was blindfolded this time during the scolding technique.

"The whole integrated emotion was one of suppression of words and movements in retaliation. The separate sensations were localized in the throat—a 'filled-up,' feeling of choking; as if all the things that I wanted to 'say back' were concentrated in one lump in my throat. My shoulders contracted and I had a 'cringing' sensation. Several times I shivered. I clenched my teeth and squeezed my eyes tight shut to keep back the words and the tears. The muscles in my legs and arms contracted to keep me from kicking and fighting back. My chest felt 'tight,' as though something were pressing on it from the inside."

Probably enough examples of more or less analytical description are now at hand to demonstrate the possibility of obtaining introspective materials from emotions aroused in the environment of the laboratory. Of course some observers do not do so well as others. Some are not given in so great detail as are those quoted above. But in almost all cases, there can be no question about the fact that genuine emotions have been aroused. Summarizing these results we may state that from the hundreds of reports, similar to the above, which we have accumulated, it is evident that certain characteristic features appear in some of the typical emotional groups.

We saw that in the typically pleasant excitement of joy, while the sensory response is widespread, the organic group appears to be prominently localized in the chest, with some tensions also in the head region. There are numerous ideas of the kinaesthetic verbal type and some visual images. The meaning is one of 'lightness.' The kinaesthetic strains are relieved in motor activity of some kind. All this suggests, but does not yet prove conclusively, that there may be a differentiation by way of localization between the pleasant and the unpleasant types of feeling. While the author is willing to grant this tentative distinction, he is not willing to identify the localization as an absolute equivalent of feeling. 'Pressury' sensations, that is, when localized in the chest and head regions, do not *make* a pleasant feeling.[1]

[1] C. A. Ruckmick, Anent the "Reality of bright and dull pressure," *Amer. J. Psychol.*, 47, 1935, pp. 330–333.

In the unpleasantly toned emotions, like anger, the organic group spreads more into the abdominal region or "in the pit of the stomach." Other sensory groups appear, especially the muscular qualities of tensing. The pleasant joys contain various strains as well, but usually not the widespread tensing of the larger muscular groups. This is also noticeable in fear. The action, as revealed in the introspective reports, however, is opposite in character or meaning. In anger the action is aggressive, as if in getting ready to strike, in fear the action is negatively directed, as in writhing to escape from an object or situation. Anger is represented as bound-up energy ready for release. As Stratton has aptly phrased the situation: "*Anger*, we may say, *is an achievement in mental progress.*" "Pugnacity in which there is anger," he states in another paragraph, "marks a distinct advance beyond mere struggle." He does not believe that the motor responses are uniform in pattern for all individuals or in the same individual on all occasions. "*Anger is thus seen to be a highly unspecialized impulsion; it has no immediate interest of its own, but arises to protect and to further any interest that you feel.*"[1] In our accounts most of the muscular impulses in anger seemed to be definitely directed against the source of irritation and are usually localized in hands, arms, feet, and legs. Occasionally we found clenching of the jaws. It would thus appear that the tension occurs in those members of the body which are phylogenetically active in aggression: arms in seizing and hitting, legs in kicking, jaws and teeth in biting.

In our work on fatigue, already described quantitatively in connection with the electrodermal response, we have found a most interesting decay of mental processes. The human mind takes on a vegetative type of existence which is neither pleasant nor unpleasant, but indifferent. Even when exercise has been intensive to the point of dreary unpleasantness and when severe pain sensations have been inflicted, not only is there sensory adaptation, but mental sluggishness to the point of no affective reaction at all. Ideas commenting on the various instructions and situations are gradually reduced in number and pace and finally almost utterly disappear. But, what is more significant, degeneration sets in with respect to the affective life which simulates the indifference of the sleeping person who is disturbed or prodded by another individual. This type of degeneration of the mental life offers us the closest approach to the incognitive type of consciousness in the early stages of the appearance of mind itself. What is left of cognition turns inward to the bodily state itself. Finally, since that is relatively insensitive in the extreme stages of fatigue, affection itself disappears and the conscious-

[1] G. M. Stratton, *Anger: Its Religious and Moral Significance*, pp. 34, 35, 254, 1923.

ness is itself practically at the vanishing point. Continued work of this sort may be exceedingly illuminating in connection with so-called confessions obtained under various methods of the 'third degree' in some of our police courts and in the offices of prosecuting attorneys. One eminent psychologist told the writer that if he were ever in such a predicament, he would throw one of his shoes out of the window as a signal to his friends that from this point on his statements were no longer his own.

We are only at the beginning of progress in the qualitative research on the emotional experiences. Many other descriptions and comments must be accumulated before we can escape the old logical or biological methods of classification. But the possibility of the approach has been demonstrated and enough preliminary material is at hand to justify a continued attack. In all our work both qualitative and quantitative data are recorded. A real emotion under laboratory conditions is too precious an event to miss whatever can be scientifically observed. While indirect procedures are valuable, we have demonstrated the fact that direct introspective modes of approach are also possible. With trained observers, many illuminating aspects of feeling and emotion should continue to be revealed.

5. Summary.—We ought now to have a fairly accurate picture of the experience of emotion as portrayed through the method of direct observation. That the picture is still meager and sketchy is not to be denied but to be explained on the ground that a beginning has been made with a very difficult and consuming type of mental process. Some of the delay in the advance along this sector of the mental life has also been methodological: the introspective method has been often misinterpreted. Lately we have seen, however, that many of the so-called quantitative procedures, especially the refined physiological techniques on the expressive side of the picture, could not be validated unless the qualitative aspect of the actual experience was taken into account. The cognitive phase of the emotion of fear, anger, surprise, and the like was an important consideration. But also with the impressive techniques, the question of the particular attitude of the observer was a problem of significant concern.

First of all we discussed the difficulty of envisaging a complex and all-absorbing mental process. We found analogies to such problems in other sciences—problems which, though delayed in answering, have nevertheless been attacked and in some cases solved. We then digressed into a discussion of the introspective method itself, or the method of direct observation. What is meant by an objective method, or objectivity in general, was analyzed. Any experience which becomes the 'object' of a report is thereby objectified. The training in

reporting mental processes from simple to complex is after all the same training that is required of observers in other sciences. When we scrutinized the introspective method itself we found in it little else save a sharp attentive focusing of experience with a latent or directly given instruction to report that experience. With training the scientific categories in terms of which such an occurrence is reported become so habituated that they are applied at the time the experience appears. This and the general observational attitude explain the fact that there is no need to distinguish introspection from retrospection in the trained observer. In laboratory work with many observers this disjunction might prove to be useful.

When the results of some of these analyses were given we saw how clear the most gripping emotions were when given in the reports. Joy, anger, fear, were thus portrayed for the most part in psychological terminology. The problem of fatigue was also again mentioned and a qualitative description furnished significant material not only as a state which has certain affective characteristics in itself but as a condition which in its mental degeneration helps to complete the genetic cycle. In our discussion of pathologically occurring emotional phenomena we shall have reason to recall the importance of a state that closely resembles perhaps the original incognitive condition of consciousness at the dawn of the mental life from the phylogenetic angle. The same reference can also be made to bear on the ontogenetic situation in the very young child. These are subjects which still lie before us and which may aid us in sketching in more completely the phylogenetic theory of feeling and emotion which we have already advanced. The program of accumulating more detailed qualitative descriptions of emotions aroused under laboratory conditions should go steadily forward in order that we may presently draw up scientifically accurate schemes and classifications of the emotions to replace those which have only logical or biological sanctions. Most of the quantitative work will thereby secure more inherent validation than is possible at this writing.

Review Questions

1. Give three reasons why emotions are difficult to describe.
2. Introspectively describe a pencil.
3. Mention ten situations which can be graded from easy to difficult from the point of view of psychological observation.
4. Distinguish introspection and retrospection and point out common elements in both.
5. Vividly imagine being informed of the death of a close relative or friend: write down all mental processes which occur. Later compare this account with a similar but actual emotional episode.

6. What chief characteristics differentiate a joy from an anger?
7. Name three common elements in the analysis of fatigue.
8. What specific introspective problems arose in the discussion of the impressive and expressive procedures?
9. Give an instance of a biological classification of emotions
10. On what bases might a truly psychological classification be built up?

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CHAPTER XIV

THE PATHOLOGY OF THE AFFECTIVE LIFE

Nothing, therefore, is more natural than that in ascertaining normal *mental* functions, mere observation should again be supplemented not only by experiments which *we* make, but also by experiments which *nature* makes for us, that is, by pathological cases.

G. Störring, *Mental Pathology in Its Relation to Normal Psychology.*

1. The Significance of Pathological Studies.—The above quotation is almost a classic. For the inclusion of a chapter on the pathology of feeling and emotion, three reasons may be given: (1) it is important to understand the abnormal conditions of mind for their own sake; (2) through unusual variations in patterns of intensity and time, pathological conditions illustrate the facts and principles of the normal mental life; and (3) from the genetic point of view they may typify either stages of arrested development or of degeneration from an attained level of function and thus they may add to the more adequate understanding of the growing mental life.

It is a truism that the deviations of the human mind from the general patterns which science and society have recognized as normal should be well understood for their own sake. Many authorities have questioned the tremendous pressure in the school, in the home, and in the affairs of life to bring all minds into a single mold. It may be a concomitant sin of psychology itself which aided and abetted this practice through the continued stress on the side of studying the general nature, functions, and abilities of the typical, normal, adult, human mind. Indeed, this had to be in order that some kind of a base line of reference could be established in the mental disciplines. The gradual emancipation of all other types of mind from the archetype came about with as much difficulty as was shown by the disruption of ties between psychology itself from the mother-discipline of philosophy. We had to be continually reminded that the child mind was not just a vest-pocket edition of the adult mind and that it should be understood and evaluated on its own ground—related to the adult mind, but not merely a quantitatively smaller version of it.

When we scrutinized the animal mind, again we needed metes and bounds such as the canon of Morgan and the avoidance of the anecdotal

method to give credit where credit was due. So in like manner a psychology of individual differences, or a differential psychology, arose which tried to accredit those variations from which the general type of mind is derived. From these variations, many of which are accepted in science and society as normal, it is an easy step to those variations which take place in minds that we choose to call sick or pathological. While these cases show certain relationships to the so-called normal individual, most authorities are aware that the primary concern of the psychiatrist is to interpret the pathological mind as such. Even an all too ready reference to the well-known classifications of mental diseases is at least from the scientific angle a hazardous procedure. Thus from the emotional angle, the first aim of the investigator is to try to fathom the affective disturbances—by all odds often the most prominent class of phenomena—just as they occur under these conditions.

But, to return to the quotation, if we keep our bearings, we find that the world of fact is related. It is all of one piece. Especially as we fathom the unknown and accumulate data we either implant upon the scattered materials a functional and dynamic or even a structural organization which follows perhaps some of the inherent patterns of our own thinking and consequently the laws of mind itself, or else, as most scientists believe, we actually find law and order gradually revealed. This law and order is then the nature of the beautiful intricacy and astounding regularity which are typified by the snowflake when seen through a magnifying glass. That means a discovery and detection of coherence and order in the universe rather than its invention or implantation on the part of the observer. Of course, if we go one step farther and integrate both the observer and the observed the distinction between discovery and invention vanishes and makes little or no difference. And that is not a point to be pressed here, but belongs rather to the synoptic categories of a philosophy of the sciences as a whole. It is well worth while, nevertheless, for the reader to be reminded of the possibilities involved in these abbreviated discussions. The main argument centers now *away from* the primary consideration of the psychiatrist and psychopathologist to understand the various phases of mental diseases and the afflicted individuals for their own sake in order that we may more deeply help them, and *toward* that more general perspective of finding in these manifestations an exaggeration of, or at least a deviation from, normal occurrences. These normal occurrences are not only normal in the sense that they are more frequently found—since a plurality or even a majority of appearances is not necessarily a criterion of truth—but also because they are consistent with the inherent principles of a lasting universe.



FIG. 50.—Facial expressions under hypnosis. A student at the University of Iowa was put into a trance state and emotional situations were suggested to him. It is interesting to note how much facial expression comes through with the eyes closed. In *A* he was told that his room was on fire and that his books and possessions were being consumed by the flames. In *B* it was suggested that his roommate had just died. Both of these portray different types of sorrow and grief. In *C* he was told that he was playing cards and that his opponent had just cheated him. He apparently seems quite indignant and resentful, if not angry. We then told him that if we were he we would beat up that man. It took three or four of us to hold him back and then he was told that he had 'licked' the opponent. Obviously the feeling of manly pride is expressed in the face as shown in *D*.

When we scan these symptoms that are the frequent accompaniments of mental diseases, we should find, then, constant reminders of the normal feelings and emotions. Through the contrasted behavioral patterns of such manifested affective phenomena we can learn much about the normal human mind.[1] The relief into which normal emotions are thus thrown may even bring to light details which would otherwise have remained unnoticed. This deviation takes place mainly in three directions: (1) in the peculiar or unusual kind of feeling experienced, for example, in the case of pleasant reactions to sensations and perceptions that would ordinarily arouse unpleasant responses, (2) in the wider range of intensities which feelings of the pathological individual may show, and (3) in the temporal pattern revealed on a given occasion or through the whole of the mental life. There are other factors, too, such as the change in the cognitive reference or interpretation of meanings from the affective angle and the history of emotional attachments to a variety of objects, which we must not overlook. But as a whole, feelings show an abnormality either on the side of extreme weakness or deadness or on the side of great vehemence and vitality. They also display the temporal deviations of being very flighty and sporadic or of being prolonged, slow in development, or chronically recurrent. From a systematic outlook these peculiarities are of paramount importance and they deserve the more extended treatment that will be accorded them later. The rôle of the emotional life and its manifold ramifications in the personality of the mentally warped or diseased personality are also subjects which need more painstaking scrutiny than we can give them now in passing. We shall still have to deal with another type of approach which we have outlined in our opening paragraph.

Whatever may be said concerning the envisagement of the pathological condition of the human mind, either as a sufficient study in and for itself or as an unusual variation from the generally conceived typical and normal mental life, there still remains a form of attack which regards these abnormal phenomena as part of a moving picture of the mental stream from its minute source, through its devious course along which it receives almost innumerable tributaries to its own substance, and finally to its emergence into the unfathomed depths of collected human experience. Here we obtain a view that best represents the meaning of the mental life. Genetic interpretations are most suited to sweeping syntheses. While they may be most hasty and therefore the most hazardous, a story of the affective aspect of the human mind

[1] Even when hypnotized an individual shows characteristically normal facial expressions in spite of the fact that in the trance state the eyes are closed (see Fig. 50).

could not be complete without them. The pathological mind fits into the picture either as one which has been arrested in its development in whole or in part, or as one that has stepped down from the high plane of its achievement and has upon it the earmarks of degeneration and decay. Perhaps most significant would be the view that in the whole list of abnormalities, samples of both processes may be found. In either case we can probably do no more than guess which direction the process has taken, unless, indeed, there is ample evidence of arrest or regression in the life span of the individual himself. More plausible possibly is the notion that the abnormality represents, in some instances at least, an imbalance of mental function. This imbalance may be temporary or permanent. It applies to the relative development of the different mental processes and their mutually interactive effect. It also typifies the feelings which may compare in various degrees of intensity and in kind with those found in minds of lower stages of development, as in the lower animals and in the preschool and pre-adolescent child. With respect to the types of affective development in the lower animals and in the child a separate treatment in other chapters is reserved. For the present we may regard the genetic growth of the emotions as applying merely to pathological instances.

Thus we see the different perspectives from which pathological manifestations of the affective life may be viewed. We shall next be concerned with the actual types of emotional behavior which are attached to clinical cases in the various categories of mental diseases. Under such circumstances the methods of approach are largely those of the observation of external behavior. Occasionally the individual can make superficial comments concerning his experiences but, of course, introspective analyses are for the most part not available. Several studies have concerned themselves with quantitative measures of bodily responses, but even these are so few and so little controlled on the side of the experience involved, especially on the cognitive or perceptual side, that much more research is needed to check the data that have already been accumulated.

2. Minor Affective Distortions.—While we can not call all cases of mental affliction pathological, any deviation from the normal functioning of mind may throw light on the more severe disturbances. Several writers point out that even when some of the sensory mechanisms are deranged, changes in emotional behavior are likely to result.[1] Since our orientation to the external world in all its manifold meanings is derived from our sensory equipment, any defect in that equipment is apt to derange our whole scale of affective responses from the simpler

[1] E. S. Conklin, *Principles of Abnormal Psychology*, pp. 24–28, 1927.

perceptual functions all the way to the more profound attitudes of the self toward its environmental objects and events. The sensitiveness of many people who are hard of hearing, which may emanate from the slightly changed facial expression of the speaker who is requested to speak a little louder or from the continued strained effort made by the many friends and relatives who come in contact with such individuals, is well understood when one realizes the intimate cross-currents which bind all members of society together. Our opinion of ourselves, to say nothing of our consciousness of self, is at least in part a reflection from the outer world in which we live. A wide individual difference naturally appears, but as a general principle defectiveness of whatever sort may lead to at least a partial upsetting of affective values.

How widespread such influences are from the mental point of view can be learned not only from the technical literature on the subject, but also from the autobiographies of individuals who have written about their readjustments. With incomparable skill Helen Keller has pictured this problem thus:

"Once I knew the depth where no hope was, and darkness lay on the face of all things. Then love came and set my soul free. Once I knew only darkness and stillness. Now I know hope and joy. Once I fretted and beat myself against the wall that shut me in. Now I rejoice in the consciousness that I can think, act and attain heaven. My life was without past or future; death, the pessimist would say, 'a consummation devoutly to be wished.' But a little word from the fingers of another fell into my hand that clutched at emptiness, and my heart leaped to the rapture of living."[1]

At another time, later in life, she wrote,

"Oh, the weariness of sitting hours in the same attitude as I have to do sometimes, not daring to look around or move an arm lest I be stared at or my uncertain movements misconstrued! I cannot see people staring at me; but I am always accompanied by persons who can see, and it is embarrassing to them."[2]

Not only can there be no pleasure in many of the objects whose primary appeal is through that channel of which the afflicted is deprived but, if the affliction dates from the earliest years of childhood, it is also very likely that imagery and ideas grounded in that channel are also lacking. The entire range of higher mental processes—memory, imagination, and thought, with their variegated meanings—must be greatly modified through the loss of one or more sensory channels. Naturally the same can be said about the sensory approaches which may give us unpleasant experiences.

[1] H. A. Keller, *Optimism*, p. 13, 1903.

[2] H. A. Keller, *Midstream: My Later Life*, p. 244, 1930.

Waggishly inclined individuals have remarked that Thomas Edison was saved much annoyance from the tumult of the world because during the latter years of his life he was quite deaf. Mark Twain once remarked that in his judgment Helen Keller's mental imagery was more beautiful than her normal perceptions, if she had possessed them, could ever be. He cited his own experiences with Niagara Falls and the Taj Mahal as proof. In his imagination before he actually saw them, Niagara Falls were "finer than anything God even thought of in the way of scenery," and the Taj Mahal was a 'rat-hole' with what he imagined it to be. On one occasion after Helen Keller had described in her own way the face of a friend, he said, "I thank God she can't see."[1]

Fortunately there are these compensations in the perceptual and ideational fields, but we must not lose sight of the fundamental fact that there must be a shift in the affective life of the afflicted because rarely are pleasantness and unpleasantness, together with the whole range of the feelings, emotions, sentiments, moods, and the like, unattached entities. They color all other processes and often require cognitive elements. When the latter are abnormally developed, the affective life itself suffers. More than that, the basic attitudes of the self to other selves and to the world at large often undergo marked changes.

Lest we be accused of dwelling too much on the sensory levels and of disregarding other aspects, like the motor aspects, let us admit another consideration, even if it be only a single instance. Any oddity of character, mannerism, dress, or physique may bring with it a like change in the emotional reaction which is reflected back to the individual from his social and physical environment. Take the matter of stuttering as an example of defectiveness in motor expression. Says a former stutterer who is also a psychologist and therefore writes about his subjective attitudes with utmost frankness and objectivity:

"In fact, every ambition I have ever entertained, as well as every aversion, has sprung to large degree from my stuttering.

"The emotional morbidities constitute a reaction on the part of myself, a stutterer, to the social situations—and this stuttering organism, with its muscular tensions, reacts more vigorously to some situations than to others. Stuttering, if my self-analysis is to be relied upon, is not a neurosis; a neurosis may, however, develop out of the fact that a glib society places a severe burden on the stuttering individual."[2]

This fundamental principle, the emotional and affective disturbances which are aroused in many sensitive individuals who differ ever so slightly, or to a marked degree, from the common run of humanity in

[1] H. A. Keller, *ibid.*, p. xviii.

[2] W. Johnson, *Because I Stutter*, pp. 16, 20, 1930.

any immediate social environment, is one of major importance in the proper psychological envisagement of almost all cases of mental disease. Here we come upon a cross-current in our argument, however. Pathological individuals as well as normal individuals differ in what Malamud calls the 'acceptance' or 'dissatisfaction' of environmental situations. They may be satisfied, dissatisfied, or indifferent. Abnormality, in other words may here step in, both in the cognizance of what is going on about the individual and in its emotional evaluation.[1] In dealing with individuals whose mental disturbance is partial, slight, or temporary, we often find many other mental functions impaired to the extent that any undue stress of adjustment to the social and physical environment places that individual in an unusual frame of emotional and affective experiences. That subjective fact must accordingly not be overlooked in the appraisal and treatment of the mental symptoms that are displayed. It simply emphasizes the fact that the mental situation is reflexly affected by environmental conditions in so far as those conditions are consciously cognized. Thus arise the so-called compensations for inferiority and superiority, as the case may be. Such disturbances of the normal mental equilibrium are frequently of an affective variety and lead to what Freudian psychologists have termed 'complexes.' Of this subject we shall have more to say in the next chapter.

3. Major Affective Disturbances.—As suggested before we may regard the pathological disturbances of the affective life principally from three main angles: (1) quality, (2) intensity, and (3) protensity, or temporal course. These disturbances arise gradually from a scale of values which may often be present in normal persons until through complexity and total integration with the mental life they become such a manifestly overpowering influence that we can then safely, although sometimes only provisionally, call them pathological or diseased conditions. That there may be indications of these disturbances under unusual circumstances even in normal individuals is widely known. By qualitative abnormalities we mean, for example, that pleasure may be derived from stimuli and situations that normally are indifferent or unpleasant in effect.

The torturing of fellow human beings or of the lower animals which leads to obvious suffering is usually repulsive and extremely unpleasant. But many high-minded and intellectually refined people through rationalization of the factors involved still believe that the best way of legally punishing rapists and bandits is via the old-fashioned whipping post and many hundreds

[1] W. Malamud, *Outlines of General Psychopathology*, pp. 186–195, 205–209, 1935

of thousands of dollars are annually spent for entertainment at prize fights. When we witness many of the struggles that go on among the lower animals in the fight for existence we are not necessarily shocked. College communities have witnessed lynchings and civilization has not yet abandoned the horrors of war. We all hope for improvement in many of these social attitudes but they are still with us. Even teasing has been construed as a form of sadism and sarcasm is not far removed from torturing. On the other hand, food that is ever so attractively served may have developed associations within that make the affective response unpleasant. When uninformed people are told that tripe comes from the lining of the stomach of an ox, that a raw oyster on the half shell is still alive and that its heart is still beating, that the deliciously prepared dish is brains, or that wine may have come from grapes that have been pressed out under the feet of peasants, frequently the appeal of the food or drink is gone and no amount of persuasion will bring back that appeal. From similar associations many people will never eat eels.

Thus we come to the more significant afflictions of the pathological sort. There are fears of persecution, of violence, of death, of blood, and of many other situations and objects.[1] These are commonly called phobias. There is a tendency now to do away with the almost innumerable special names of these phobias, although Hall suggested that they be brought under a logical order of genera and species. The fact of the intense experience remains, however, and if the reader doubts the torments which it may occasion he ought to consult one of the best 'confessions' that have ever been set down in the psychological literature. While the anonymous writer of this confession describes several forms of phobia, his most persistent one is that of dreading to cross open spaces (agoraphobia). The open space may be from one chair to another in a room or a wide street. He ends by saying, "I see a man hobbling past my house on crutches, a cripple for life, and I actually envy him."[2]

In the same manner, an individual may become angry at the slightest and at the most unwarranted occasion. Moroseness may appear, or great hatred where none is normally due. When ordinarily emotional reactions may to a large extent be expected and predicted, in these pathological cases the reactions seem unusual and even absurd. In contrast to the positive or extremely unusual symptoms of emotion, there are in many cases forms of great apathy. It is frequently found

[1] G. S. Hall, A synthetic genetic study of fear: Chapter I, *Amer. J. Psychol*, 25, 1914, pp. 171–172 (lists 135 phobias); J. J. B. Morgan, *The Psychology of Abnormal People*, 1928, pp. 247–248 (lists 24 phobias); H. C. Warren (ed.), *Dictionary of Psychology*, p. 307, 1934 (lists 22 phobias).

[2] "Vincent," Confession of an agoraphobic victim, *Amer. J. Psychol.*, 30, 1919, pp. 295–299.

in the early stages of dementia praecox, where a degeneration of all interests and aversions takes place and where the individual has lost all pride and ambition.[1] In terms of all types of overt response, there is no show of emotion where ordinarily some form of emotion is expected. These individuals may be cold, apathetic, unresponsive. Affronts and insults do not result in resentment, indignation, or anger; kind treatment is not followed by a feeling of fondness, gratitude, or pleasure. There is a surprising emotional indifference to all kinds of surroundings. In our experiments, the sudden slapping of the face will reflexly start an anger, even though it be later checked. The observer may then laugh at himself for having become angry. But in the apathetic condition there is no indication of even a reflex appearance of the symptoms of resentment. The same principle applies to pleasant stimuli and situations. It is clear that the diseased individual cognizes the situation. He knows what is happening in great detail, but there is no arousal of emotional responses and the general attitude is one of "I don't care." In that sense it must be distinguished from the indifference which comes from fatigue and which was discussed above. Here there is a reduction of all mental activity. Mind is in general insensitive as well as apathetic. Associated ideas and meanings come slowly and rarely. The condition must also be delimited from the apathetic state of heroes and martyrs who have rationalized away the situation or stimulation of pain and have thus substituted one set of meanings for another. Both of these types are vastly different from the pathological condition, although, indeed, they may be related to it.

Opposed to this apathetic condition is that of extreme irritability. Constant anxieties, dreads, ecstasies, feelings of guilt or of reproach, gaiety, and the like, form as a continuous procession. These individuals are 'bundles of emotion.' They seem to be always emotional. There is hardly a moment of calmness or indifference. Many classes of sensory stimuli, all the daily situations, the parade of mental imagery and of ideas are all highly colored with affective tone. We commonly speak of many normal individuals and of children also as being emotionally unstable. Clearly then there are again all gradations of this type of disturbance from the normal to the abnormal. Some authorities in this field tend to believe that a total absence, or even a great reduction of emotional expression and feeling is more dangerous to mental health than its opposite form of great exuberance. The answer lies in part to the principle of repression which is attached to the Freudian doctrines and which will be discussed later and in part to

[1] J. W. Bridges, *Psychology, Normal and Abnormal*, pp. 184–185, 1930.

the fact that conscious suppression may be in turn a symptom of or an antecedent condition to introversion. While overemotional people may be socially annoying and their judgments may often be erratic, they do less damage to themselves from the mental point of view. Physically they may increase the catabolism of their bodies, but that is always a hazardous statement to make because from an individual point of view we have no scientific check on the natural life span devoid of any such symptoms.

In this connection we should observe that Ribot originally made the point that the degeneration of the affective life takes a definite course. The types of feeling which became attached to the highest cognitive processes, namely, the abstract ideas which are related to aesthetic, moral, and intellectual appreciation, are the first to go. With them go the altruistic, or what Calkins calls the 'sympathetic,' emotions,[1] and later the primitive and self-preservative emotions like anger and fear. With the latter then also the affectively colored sensations ultimately disappear. The order of progress is thus reversed: development as we portrayed it makes an about-face in the process of degeneration.[2]

Lastly we are faced with another possibility in the qualitative derangement of the affective life. Malamud has termed this the 'ambivalence' of the feelings.[3] The same mental processes from the cognitive angle may arouse opposite emotions, such as love and hate, like and dislike, attraction and repugnance, *etc.*, at the same time. Not only is no prediction possible, but a very rapid oscillation makes the response doubly ambiguous. Stability is lacking because the situation is emotionally exhausted.

All this brings up our former discussion about the rôle of the cognitive processes in emotion and the fact that feeling does not stand alone in the mental life. Some psychopathologists have argued that the anxieties which are so frequent in cases of neurasthenia are groundless and objectless, but Janet is probably nearer the fact when he states: "*They objectivate in their persuasions a feeling they have in relation to themselves and to their actions*," and again, "*It is their own action of which they are afraid.*"[4] In this case the self becomes the object and many feelings are very definitely self-directed in most of the mental diseases. Perhaps an outstanding exception is the situation in psy-

[1] M. W. Calkins, *First Book in Psychology*, 4th rev. ed., pp. 185–186, 1914.

[2] T. Ribot, *op. cit.*, pp. 423–437.

[3] *Op. cit.*, p. 209.

[4] P. Janet, Fear of action as an essential element in the sentiment of melancholia, in *Feelings and Emotions: the Wittenberg Symposium*, (ed. by Reymert), pp. 299, 301, 1928.

chasthenia or schizophrenia, where according to Coriat the two essential symptoms are the feeling of unreality and the sense of depersonalization.[1] He explains these phenomena in terms of a dissociation which may lead to a state of multiple personality and also mentions the functional anaesthesia of organic and muscular sensations as a basis. Malamud, however, stresses the faulty but elaborate appreciation of cause and effect or the acceptance of simple though childishly inadequate explanations of causal relations.[2] Hence again there is an object relation to the feeling, but the difficulty comes from the fact that the relation of the various objects to the self is in a fluid and unstable condition or is, from the normal point of view, fantastic. Certainly in the paranoid condition there is often an exaggerated delusion of grandeur and self-defense against persecution by blaming other individuals for various shortcomings.

It is not the purpose of this chapter to enter into a discussion of the mechanisms which underlie all kinds of mental disorder. But it is important to distinguish problems which center principally about the emotional life from those which are primarily concerned with cognitive factors, like the hallucinations and the delusions. The point, however, is that the materials are inextricably interwoven. We suspect that the solution to the problem of the pathology of the emotions lies partly in the relative overdevelopment or underdevelopment of the affective factors as compared with other mental processes and partly in the inadequate meanings that are assigned to the cognized objects and situations. The latter inefficiency of perceptual and ideational functions would then also carry with it a distorted scale of emotional responses.

Before we leave this section we must also refer to that inherited class of mental disease found in feeblemindedness. Hollingworth indicates that the chief affective disturbance here is found to be of a "general, ungraduated, and non-discriminative" type. There is lack of moderation and inhibition in the response. It is of the 'all-or-none' form and compares with normal infantile behavior. He quite plausibly points out that the explanation lies in the inadequate symbolism at the various mental levels of feeblemindedness. Troland's retroflex activity of the frontal cerebral lobes is not properly functioning. Again the trouble is seated in the maladjustments to new stimuli and situations in terms of a disorganized repository of past experience which in turn was not integrated at any too high a level. Once more the difficulty seems to lie at the focal point of cognition as a necessary instrument in the even balancing of emotional behavior. Let us go on

[1] I. H. Coriat, *Abnormal Psychology*, p. 359, 1923.

[2] *Op. cit.*, pp. 88–90.

to other aspects of affective distortion to see whether this dual mode of attack, *i.e.*, (1) the undeveloped state of the affective life and (2) the unbalanced interplay of cognitive factors, will not in the main take care of most of the emotional pathology which we find.

In disturbances which are characterized by marked deviations from the normal intensities of feeling we have already observed the possibilities of either an exaggerated state of emotion or one of apathy and indifference. Some of the conditions are obviously traceable to real or imagined physical conditions like the high degree of fatiguability which usually accompanies the neurasthenias. In other cases it is related to the stupor or sopor of catatonic conditions, in which the body retains postures described as being of 'waxy flexibility' in all or some of its parts. While such periods of low emotional ebb, of depression, and of slow irritability may be found as chronic conditions, the higher intensities occurring in the hysterias, in the manic states of the cyclothymic disturbances of mood, and in the impulsive stages of catatonia are the more noticeable because of their destructive effects physically as well as mentally. Catabolism in this condition is assumed to be at a supernormal level. Many psychiatrists also regard the mental effects, through memory traces and auto-suggestion toward future conduct, as something to be avoided. Any, however subconscious, recall of having once flown into a wild passion may in itself be an adequate preparation for the next flight into violence. This naturally applies to normal human beings as a measure of mental hygiene as it does to the abnormal, only in the latter case the periodicity established in cyclothymia is apt to be much more frequent and the outbreaks much more violent. We must remember that the emotional life may be broken down to more primitive levels so that rage is likely to appear rather than anger, and anger rather than indignation; also that the intellectual checks and balances, due to the consciousness of ideals of conduct and the envisagement of social opinion, may be either broken off as a dissociation into another system of conduct or else, perhaps totally nonexistent.

In these individuals, one aspect of the problem becomes unusually important. When we say that feeling is at a low ebb or at a high level, we are again judging almost entirely from expressive symptoms of behavior. There is no way of knowing what the true introspective picture might reveal. Perhaps, therefore, we may have to say that the emotional responses as such *indicate* a low or high intensity of experience. A decadence of motor symptoms is itself present in various forms among pathological individuals. We need but mention *stereotypy*, referring to the more or less automatic and monotonous repetitions of speech and other movements, *apraxia*, which implies the loss of ability to execute skilled performance without actual paralysis of the parts concerned being present, and *ataxia*, which involves

the loss of coordinated movements in some motor unit of the body. In the reports of experiments performed on psychopathological subjects, several investigators have placed a fair amount of reliance on introspective observations. Franz believed that "There is no inherent difficulty in investigating the mental conditions of the insane"[1] and Boring,[2] working with eight patients, diagnosed as cases of dementia praecox, found that they could give "reports indicating the general trend of consciousness . . . with about that degree of reliability that is found in reports made by untrained observers with little education and a poor command of language." The only difference noted was in the introduction of irrelevant material. Campbell, a well-known psychiatrist, is apparently quite willing to take into account the entire personality of the patient when he says:

"The personality means the individual in action, with his behavior and his beliefs. It includes all the partial functions which may be studied in other disciplines; it includes all the chemical changes; it includes all the physiological activities as well as all the overt reactions, all the thoughts and emotions and strivings of the individual."[3]

Another phase of the subject is suggested by the well-known fact that the overt expression of the emotion is repressed and inhibited due to the unbearable intensity of the emotional response and is therefore a device for solving a difficult emotional problem. It may result in the appearance of apathy and emotional dullness, when as a matter of fact the person is saving himself against the wear and tear of emotional excitement. What this actually does subconsciously may be of interest to the psychoanalyst but it offers at least a 'face-saving' possibility. Such repressed emotions may then emerge later, perhaps even more violently, or at least with still other mental symptoms, because they have been temporarily throttled.[4]

Since the extreme intensive changes obviously are related to many of the other phases of emotional and affective disturbance which we have already discussed, we can not here take space to repeat what we have already mentioned in previous connections. Suffice it to say that most of the symptoms are interrelated so that in the dilapidated form of dementia praecox, termed by Kahlbaum and Kraepelin hebephrenia, the mild giddy type of silliness, for

[1] S. I. Franz, Psychological opportunity in psychiatry, *J. Philos. Psychol. & Sci. Meth.*, 3, 1906, p. 567.

[2] E. G. Boring, Introspection in dementia precox, *Amer. J. Psychol.*, 24, 1913, pp. 145–170.

[3] C. Macfie Campbell, Clinical psychiatry in *The Problem of Mental Disorder* (ed. by Bentley and Cowdry), p. 17, 1934.

[4] J. W. Bridges, *op. cit.*, pp. 203–204.

example, which is manifested to a slight degree in adolescent children in the 'giggling' stage, becomes here the last mild form of emotional deterioration.

We have still before us, however, an important aspect of the pathological problem, namely, the temporal phases of disturbance. One of the outstanding conditions as compared with normal behavior is the chronic or relatively permanent feature of the affective defect. The 'giggling' above referred to in the adolescent girl is normally but a temporary phenomenon, though it may be more prominent at certain ages. The depressed moodiness of the normal adult may be short-lived. We commonly acknowledge this by saying that perhaps "he got out of the wrong side of the bed," or "you will get over it in a moment." During certain stresses of life affective changes which are noticeably different from the normal run may last for some time and some of these manifestations may approach in character the phenomena which we declare to be pathological. Of course in the pathological picture the mental and physical symptoms, other than affective or emotional, play an important part, prominent as the affective disturbances are, in diagnosing a case as diseased. The lasting or relatively permanent nature, then, must be emphasized as one of the temporal characteristics of affective pathology. There are other temporal phases, like the gradual shift of emotional response with time. Not only the gradual deteriorating stages already noted but also the relative speed with which emotions are aroused in different individuals has to be taken into the reckoning. One case may be easily aroused, constantly irritated, and highly sensitive. Another may be aroused much more slowly, but when once aroused may 'fly off' into the most vehement of passions. Something of this sort is what is still left of the old 'temperaments' of *choleric* and *phlegmatic*. Then we find cases in which the emotions are quite *labile*. There is a rapid shifting from weeping to laughing, with their corresponding emotional experiences.[1] The hysterias are characterized by this 'flightiness' in the affective life, which once more finds its analogue in the minds of normal children, especially in their preadolescent years. When a ten-year-old child is 'full of the giggles' and everything seems funny, tears of sadness may not be far off. As Fox points out, however, the shifting of moods not only is an affective disturbance but is accounted for by the fact that hysterical subjects are enormously active in the rapidity with which ideas shift in the mental stream and in the richness of imagery. Attention is concentrated mostly not on these ideas in themselves, but on the self. Consciousness is egocentric and attention is also solicited to the

[1] C. D. Fox, *op. cit.*, pp. 355–359.

self from without by way of sympathy. Again we see the force of cognitive material as the basis of feeling and emotion and the importance of the principle that emotional experiences generally have cognitive attachments.

Finally we have the cycloid forms of occurrence, in which the temporal interval becomes somewhat longer, the shift is not nearly so rapid, and the affective response is much more intense in both phases of the cycle than in the case of hysterical subjects. From some angles these disturbances, which come under the rubric of *cyclothymia* or of the manic-depressive psychoses, seem to function in a compensatory fashion. In normal life, for the excess energy that is put out in the direction of the jovial and hilarious mood by way of excitement, the penalty of a period of doldrums, of melancholy, and of depression is exacted. Many professional clowns, humorists, cartoonists, and comedians know the turn of emotional experience at first hand and some of them have been led to commit suicide as the result of extreme downheartedness.

In pathological subjects of this kind, who are also often of the schizophrenia type, more or less complete dissociation of personality sometimes results as an accompanying phenomenon.[1] The periods with their oncoming symptoms are generally predictable in individual cases and the accompanying disturbances are often combated by the psychiatrist so as to provide less and less of a memory cue toward successive appearance. Physical measures, like hydrothermic treatments, are sometimes resorted to in order to avert the recurrence or gradually to modify it toward normal proportions. No complete eradication is desired, for it is part of the run of life to encounter its 'ups' and 'downs' and to give a certain amount of response thereto. As a part of mental hygiene it is well to recall that the adages, "it is darkest just before the dawn" and "when we are sick we think of dying" convey the principle of a likely turn of the wheel of feeling. Joy can not last forever and a certain amount of grief, if it be not overpowering, even in the vernacular sense of the term, is not to be avoided. Only the failure to adjust "while the mood is on" may lead to mental deterioration. Here Cason's advice through such methods as 'delaying the response,' although admittedly of wide individual variation in their application, is worth a trial.[2]

4. Quantitative Studies.—Although the precipitates of the various studies which have to do with the physiological reactions of psychopathic patients have not yet settled down into a form that merits

[1] S. I. Franz, *Persons One and Three*, 1933. M. Prince, *The Dissociation of a Personality*, 1910.

[2] H. Cason, Methods of preventing and eliminating annoyances, *J. Abnorm. & Soc. Psychol.*, 25, 1930, pp. 40–48.

generalization, we may tentatively indicate with Darrow and Solomon that outstanding differences have been found between such subjects and normal individuals in the responses of the former group to (1) relatively simple sensory excitations such as startles from sudden noises, (2) indifferent ideational stimuli consisting of words or questions, and (3) words or questions which according to case histories might be interpreted to refer to definite meanings in the past experiences of the patient. In general small changes in blood pressure between the systolic and diastolic levels and small electrodermal responses tend to be related to impairment of the physiological functions of the body. Small changes in blood pressure to crucial ideational stimulation and small electrodermal responses to all forms of ideational and sensory stimuli tend to be related to a lack of "contact with reality." When, on the other hand, the changes in blood pressure are large and the electrodermal response is slight, correlations have been found with irritability and similar manifestations. Skin resistance appears to be associated inversely, moreover, with the amount of free nervous energy that is manifested in the 'anxiety' psychoses. All told, the emotional nature of the stimulus and the emotional state of the patient at the time that the test is made are primary considerations in the interpretation of the results.[1] Other investigators have found some positive indications of a relationship between diseased conditions of the thyroid, the rate of basal metabolism, and the electrical properties of the skin, but it is more than likely that the regulatory mechanism for bodily temperature is also involved.[2]

The literature on the relationship of the electrodermal response to the various neuroses and psychoses is still in an unsettled state. Some agreement among the investigators seems to appear, however, in such cases as schizophrenia, where Syz and others have found a marked irregularity in the respiratory and electrodermal curve. The latter type of response is also greatly diminished in catatonic stupors. Syz believes that in spite of the qualifications with which investigations of this sort must be interpreted, the electrodermal response offers help by way of an "objective, experimental discrimination and characterization of some of the outstanding psychopathologic reaction patterns."[3] At the same time we must beware of too broad generalizations. Darrow and Heath claim that the 'recovery-reaction'

[1] C. W. Darrow and A. P. Solomon, Galvanic skin reflex and blood pressure reactions in psychotic states, *Arch. Neur. & Psychiat.*, 32, 1934, pp. 273–299.

[2] W. Lueg and K. Grassheim, Welche Forgerungen lassen sich für die Schilddrüsenfunktion durch vergleichende Untersuchungen von Grundumsatz und Polarisationskapazität der menschlichen Haut ziehen?, *Zeits. f. klin. Med.*, 110, 1929, pp. 531–539.

[3] H. C. Syz, Psychogalvanic studies in schizophrenia, *Arch. Neur. & Psychiat.*, 16, 1926, pp. 747–760.

quotient, obtained by taking the increase in the electrical skin resistance in ohms during three seconds following the peak of the reaction and dividing it by the decrease in resistance in ohms from the stimulus to the peak of the curve, appears to give a good indication of the absence of 'neurotic' tendencies, while the rate of recovery of resistance during two minutes of rest after the cessation of stimulation is one of the better indicators of 'neurotic' trend. A generally low level of resistance seems to be related to depression and paranoid tendencies. A large rise in blood pressure after conditioned stimulation is positively related to 'neurotic' trends. In summing up the various studies, however, Landis takes his characteristically negative attitude by saying:

We failed to find that the reflex invariably or solely accompanied the objectively observed signs of emotional disturbance, correlated with tests of emotionality, or bore any definite relationship to the personality of the individual, so far as that personality might be judged from records of his previous behavior.[1]

While it is probably too early to look for any definite indicators of emotional disturbances or traits of personality, we must not fail to note progress not only in the refinements of techniques but in their interpretation. Certainly the facts which these techniques reveal are much more stable and definite than the hazy items and class names by means of which we have heretofore tried to identify the emotions, the patterns of personal behavior, or the pathological mental conditions. This state of affairs is perhaps more clearly stated by Darrow when he wrote:

"It must be kept in mind, also, that these psychiatric groupings are obviously impressions based largely upon similarities in overt behavior which may be observed without recourse to refined experimental measurement. Certainly these should not be the only criteria with which we relate our data. If the use of refined physiological technics is merely for the purpose of confirming that which may be observed by the naked eye and ear, surely there is little reason for workers to devote their time and other people's money to the pursuit. If, on the other hand, refined physiological measurements are for the purpose of noting generally unobserved physiological tendencies which may be related to behavior or to the mental mechanisms which are assumed to govern that behavior, then the galvanic skin reflex, as well as other recordable bodily reactions, has, we believe, a unique significance. Lending themselves as they do to both physiological and psychological interpretations, such reactions represent in a very real sense the ground where physiology and psychology or psychiatry overlap. The proper use of such measures may carry us far toward an understanding of the relation of the physical to the mental aspects of human reactions and definitely further the understanding of individual behavior."[2]

[1] C. P. Stone, C. W. Darrow, C. Landis, and L. L. Heath, *Studies in the Dynamics of Behavior* (ed. by Lashley), pp. 241–243, 302, 1932.

[2] C. W. Darrow, Considerations for evaluating the galvanic skin reflex, *Amer. J. Psychiat.*, 13, 1933, pp. 285–298.

This is exactly the attitude of the present writer. It has been our experience that under carefully controlled conditions we have obtained data that (1) were of diagnostic significance to the psychiatrist, with whose cooperation some of our studies have been carried out, and (2) were of taxonomic interest in suggesting possible weaknesses in the present nomenclature applied to the various classes of mental diseases. Greenwald has discovered, for example, that for both normal and abnormal individuals the electrodermal responses were of somewhat greater range in the case of 'suggestive' or erotic scenes in motion pictures than in the case of scenes depicting danger or conflict. The mean responses of both groups of individuals were about equal and no significant relationship was found between the profiles, representing successive ranges of intensities as measured in terms of the percentage of the individual's original dermal resistance, and the classes of mental disorder as recognized at present. In the manic-depressive group, however, the reflex did show a distinction between the manic and depressive stage and the profiles gave a clear picture of the emotional tone of the patient as clinically diagnosed. The greatest contribution to clinical practice was made in revealing, through the electrodermal response, special significances which were connected with definite scenes, to which the normal individual often did not respond at all, but which were later found to refer to some hidden past experience of the patient which had not been uncovered by any other clinical technique. This illustrates in a general way the status of the various physiological and quantitative measures. They run the danger of overemphasis born of a devout wish. History shows this danger, but there is no way of meeting it except through the cautions that are exercised by experts in the field over a considerable period of time. We should also realize the fluid condition of class names in the field both of emotion and of psychopathology—a fluidity that will gradually become replaced by a more stabilized nomenclature. Then we should also acknowledge the status of these quantitative methods. They are not meant to replace the other diagnostic procedures, but to become accessories to them.

5. Summary.—In going over the material covered in the chapter we have found that most of the abnormal disturbances of emotion are related, as the term 'abnormal' itself indicates, to normal occurrences in everyday life. The disturbances in emotion usually take one or more of three forms, varying in the quality, as in the case of a pleasurable experience in place of the usual one of aversion; varying in the intensity, so that it is either more mild or more violent than the normal emotion under the same circumstances; and finally varying in the temporal pattern or in duration. The mild disturbances found in the

defective cases of blindness, deafness, stuttering, and the like have been discussed and then the major distortions were outlined. In all cases there is not only the picture of the particular emotional upset but the general affective response of the individual to the unusual environment into which he is placed because of his defect.

Throughout the discussion we must also have been convinced of the part that the changed cognitive attitude has played in the field of feeling. The two kinds of phenomena are closely associated and the defects found in one influence the other. The question was also raised as to whether we can absolutely depend upon the expressions of emotion as indicative of real feeling, since in some cases disturbances of the motor sort may also be present. The facts concerned with the bodily expressions of emotion in the detailed investigations of the various reflexes were also presented, showing a promising future for this type of attack provided we are willing to accept the objectively discovered phenomena in reforming some of the categories of mental disease.

Review Questions

1. In what ways may the environment of a deaf person influence his emotional or affective behavior?
2. Describe from your own experience an emotional episode which approximated an abnormal fear.
3. Give instances showing that cyclothymia or schizophrenia may be approached in normal individuals.
4. What is meant by the factor of protensity in emotional disturbances?
5. In what way is the lack of 'contact of reality' manifest in physiological functions; what other fairly definite physiological symptoms are there for mental disturbances of an emotional sort?
6. Give an example from your own experience showing the value of a delayèd response that has been voluntarily initiated.
7. What influence has memory on emotional disturbance?
8. To what extent has the interpretation of the pathological mind been changed in the last few decades?
9. What are some of the common phobias?
10. List all the emotional abnormalities that have been mentioned and relate them logically one to another.

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CHAPTER XV

THE RÔLE OF FEELING AND EMOTION IN PSYCHOANALYSIS

The entire psychology of Freud is a discussion of the miscarriages which occur in this lifelong process of integration, their causes and remedies.

E. B. Holt, *The Freudian Wish.*

1. The Foundations of Freudian Doctrines.—It is always hazardous to seek a few basic principles which form the foundation of any structure like psychoanalysis, because the foundation is composed of many stones all with a varying history behind them. But if one were restricted to the two most important influences from the angle of systematic psychology, the choice would probably be confined to (1) the old Empedoclean notion of attraction of like to like and the avoidance of unlikes, which in turn emerged into (2) the dynamically conceived system of Herbart, who then needed the notion of a threshold and ultimately the idea of the subconscious. We are already familiar with the affective theories which explain pleasantness on the basis of pursuing stimuli and situations that are favorable to the organism and of avoiding the unpleasant ones. More specifically, pleasantness is associated with the facilitation of the physiological and biological functions of the organism while unpleasantness is associated with their inhibition. Still more recently there has been an increased tendency to regard pleasantness as associated with a high degree of unhampered mental and physiological activity and unpleasantness as being connected with an inhibited, thwarted, and diminished mental and physiological activity. This general assumption appears to stand as a fundamental principle in the doctrine of psychoanalysis. The other assumption is that of the subconscious or its equivalent. Herbart answered Kant's observation that psychology could not become a science in the quantitative sense because while consciousness went on in the temporal dimension, no other attribute could be described which could thus be measured in units of time. Herbart corrected this error and probably exaggerated the concept of force which he created. Stripped of its metaphysical connotations it has become our modern *intensive* attribute of mental processes. His dynamical constructs, however, had a tremendous and lasting influence and preserved for

almost a century the notion of an apperception mass. New ideas as they were presented to the mind were met at the door, so to speak, by friends and by enemies. A struggle ensued and the relative number of favorable ideas together with the inherent strength of each one of them as against the number and inherent strength of opposing ideas determined the outcome. This led to mathematical formulation of resultant forces.

We can not go into the matter more deeply here, for we wish to indicate only the background for the Freudian principles as illustrated in emotional conflicts. But one thing is certain: the Herbartian notion prevailed, namely, that from the philosophical angle no idea could be destroyed because, following Leibniz, ideas were real entities, therefore there could be no absolute forgetting—only relative forgetting. Since no idea could therefore be nonexistent, only apparently so, a threshold of clear consciousness was assumed, where the struggle for supremacy might go on. This gave rise to various theories of the subconscious and the unconscious and in this fertile ground Freudianism later grew into its full stature. The conflict among ideas was thus also emotionally construed.

Lest it be said that the Freudian psychology, if a system of psychology it be, consciously inherited these basic assumptions, we must explicitly deny any such implications here. As far as we can tell from Freud's historical writings, no such real impetus from the treatises of Leibniz, Herbart, and the rest contributed to Freud's thinking. Freud evolved his so-called system from his contacts with other practicing neurologists and physicians, chiefly Charcot and Breuer, and from his own rapidly growing experiences with patients, largely those suffering from hysteria. But emphasis is placed on the basic assumptions discussed above, because Freud's system was falling into the soil of a world that had been thinking in these terms. Its fairly rapid assimilation can be traced to this theoretical preparation. At least that was the background for the movement from the angle of historical psychology. As with discoveries and theories in other sciences, the setting of the stage is important in this case.

What interests us here in connection with the feelings and emotions is that psychoanalysis has called itself a "feeling psychology," with a marked antipathy against the previous intellectualistic tendencies.[1] The entire system rests on such affective concepts as impulses, desires, emotional complexes, attitudes, and motivations. The drives that are suppressed and the relations between the id, the ego, and the superego are largely emotional in nature. We shall have to examine this factor more carefully in the following section.

2. The Affective Phase of Psychoanalysis.—In the early years Freud was much impressed by the hypnotic treatment which Charcot used to

[1] R. S. Woodworth, *Contemporary Schools of Psychology*, pp. 126 ff., 1931.

cure his neurotic patients in Paris. Dr. Axel Munthe has dramatically pictured these sessions in a passage of his delightful memoirs entitled, *The Story of San Michele.*[1] After studying with Charcot for a year in 1885 he came back to Vienna only to be disappointed with his ability to hypnotize neurotic patients and with the ineffectiveness of the cure supposedly made by this method. He returned to France and this time examined the claims of the Nancy school of hypnosis, which gave a mental explanation of the phenomenon instead of Charcot's pathological interpretation and which stated that over 90 per cent of the patients could be hypnotized. But he discovered also that the charity patients were much more susceptible to hypnotic treatment, because they were less sophisticated. His own private patients were treated, however, only with indifferent success and so Freud was eager to exchange hypnotic treatment for some better technique. At about this junction Freud was impressed by the cathartic process of free association. The patient was placed in a relaxed bodily and mental state and told to talk freely. An older Viennese physician and a close associate of Freud, Dr. Breuer, had had some success with this method, provided the patient agreed to be utterly frank and unrestrained. Both Breuer and Freud attributed the result of this treatment to the release which it afforded to pent-up emotional energy that had been kept from expressing itself adequately because of social and personal inhibitions. This energy could not be actually resisted. It was shunted off into other channels where it produced the pathological symptoms of the neurosis or the psychosis involved. The incident which caused this situation originally was likely to have been completely forgotten in the fully conscious sense. Through the 'talking-out' method, hints were given concerning the incident. The skillful practitioner then wove the threads of the story together so that the circumstances were recognized by the patient and further elaborated upon.

The sexual side of the psychoanalytic structure was developed early. At an evening reception Charcot was supposed to have discussed a case that had been treated during the day's work and to have commented on the sexual basis for the neurosis. "Always, always, always" were his emphatic words, but they were later denied by the speaker.[2] Soon the fundamental principle of the early sex life of the individual was made as essential as that of repression and therefore no other phrase has come to describe so well the whole Freudian edifice as *infantile sexual repression.* Originally the repressed complex may have been

[1] *The Story of San Michele,* Chap. XVIII, 1930.

[2] E. Heidbreder, *Seven Psychologies,* p. 377, 1933.

due to a strong emotional shock, misinterpreted in the early years of inadequate experience, or to an unfulfilled wish or desire. This experience is not a normally occurring memory or a group of ideas; it is rather an experience strongly saturated with an emotional impulsiveness. The unconsciousness in which such experiences were integrated was not a quiet resort: it was a mass of striving, belligerent, and restless impulses. There is resistance against the direct reproduction of these memories, which Freud calls 'concealing' memories, and he discusses these under three headings: (1) regressive, (2) encroaching or interposing, and (3) contemporaneous or contiguous. The first type is illustrated by an idea which refers back to childhood experience, but which is camouflaged by that early experience; the second type is the reversal of this form in that there are inhibitions against the recall of the earlier childhood experiences which in themselves were indifferent, but can not now be recalled in direct form because of present resistance; and the last type of memory is that which conceals experiences that are occurring at about the same time that concealment takes place.[1] In many instances Freud speaks of these memories not in the ideational or intellectual sense but as "rebellious emotional feelings," or as "hostile feelings and impulses," or as "emotional constellations."

The emphasis on the sex motif caused a rift in the camp of the psychoanalysts. Jung and Adler, for example, did not utterly deny the importance of the infantile sex life in the repression of childhood memories and in the creation of the abortive symptoms of the psychoneuroses, but they refused to believe in the sole significance of the sex life in this connection. Jung began to claim more and more that the principal difficulty lay in the direction of a maladjustment to present environment which developed such types as introvert and extravert, only the latter of which was primarily guided by feeling. The introvert turned his references inward reflectively and deliberatingly; the extravert regarded objects, persons, and events emotionally and with interest. He later also included the normally reacting person as an ambivert. Jung retained the concept of the libido which lacked, however, the primitive sex impulse, but simply expressed its inherent vitality and its inner tendency to survive. A similar defection occurred in the case of Adler, who supplied us with the notion of the inferiority and superiority complexes in the struggle for self-assertion and mastery. Complete rule is the complete man. Any weaknesses in that direction, if brooded over, lead to the psychoneuroses. These involved fantasies which compensated for the things which reality did not furnish. The style of life is fashioned in the earliest years and is orientated toward the

[1] S. Freud, *Psychopathology of Everyday Life* (trans. by Brill), pp. 58–68, 1914.

three great goals of life: (1) that of the community or group in which he finds himself, (2) that of active occupation, and (3) that of love and marriage.

The various forms of psychoanalysis developed a serviceable technique in their interpretation of dreams. Here barriers were removed, resistances modified, and inherent impulses revealed. But they are not revealed in all their stark nakedness or even in mutilated form, for there is also a dream censorship. This leads first of all to *condensation* of the latent dream by the actually recited dream story. This condensation is very complicated since it does not form the sort of code that could be formed through the analogy of leaving out the vowels and keeping the consonants, nor is it of the type in which outright substitution of one element in a content for another element is made.[1] There is secondly the principle of *displacement* through allusion. Here again there is a vast difference between allusion in the ordinary sense, for example in the telling of jokes, because in that case there is an obvious reference to outside association in the ambiguous meanings or sounds of the words, and, besides, a certain degree of obvious internal intelligibility obtains. The reference in the distorted dream is much more subtle, since obfuscation and disguise is at the very heart of the process. The third artifice is that of *translation* into visual imagery. Even abstract concepts are thus forcefully embodied into pictures. How much distortion can take place here can be realized when such an abstract quality as virtue is translated into a concrete visual image. The manifest dream then becomes relatively unimportant.

The interpretation of the dream into its significant forebears, the gradual process of reliving the situation which the manifest dream so skillfully camouflages to escape the censor, the recognition of some of these details in their original setting so that still others may be forthcoming—all this has become a frequent technique in the hands of an expert psychoanalyst. The technique is used by Freud, Jung, and Adler much in the same way but for different purposes: Freud utilizes it to reveal *past* sex experiences that are either wished for and repressed through personal ideals or are inhibited by social custom, taboo, and tradition; Jung by contrast would interpret it as revealing inadequacies in adjustment toward *present* situations; and Adler would relate it to the building up of a style of life in connection with *future* crises. In all cases feelings enter into the picture either as special coloring which produces by distortion a neurotic situation or a drive by way of motivation that leads to certain frustrated ends and therefore to pathological conditions as an outlet. Since the sex motif is common to all systems of psychoanalysis, though emphasized in different

[1] S. Freud, *A General Introduction to Psychoanalysis*, pp. 141–179, 1920.

degrees of importance, let us examine this emotional factor more closely.

3. The Sex Impulse in Psychoanalysis.—As has already been mentioned Freud makes a central theme of the potent sex impulse from the early days of infancy on, not only as a dynamic biological urge but as an emotional experience. It is for that reason that we should discuss it in greater detail than some of the other principles involved in the system. Naturally it was taken over bodily from the biological sciences and from life; naturally, too, it was frequently manifested in the hysterical patients. The name 'hysteria' is etymologically derived from the Greek word 'hystera' meaning 'womb.' Since on the principle of a polymorphous aspect practically all the infantile reflex movements, like sucking and grasping, have been given a sexual connotation and the pleasant experiences of the stimulation of the erogenous zones of the body during infancy and childhood have been commonly assumed by the Freudian school, one logician, Bogoslovsky, has pointed out the curious elastic or dynamic middle term in the formal syllogism underlying that form of argumentation.[1] From any genetic point of view of the mental life it is hardly conceivable that the full meaning of the sexual impulse could be attained at such an early stage of mental development. Since Freud is not content to put out the impulse merely on the biological level, but squarely on the level of conscious emotionality, if one did not accept the concept of an elastic or dynamic middle, his argument might be challenged on the basis of an ambiguous middle. While we are on the subject of formal logic, we might also challenge the argument that even if hysterical cases exhibit a strong sexual component, it would be rash to allege that all psychoneuroses, and all normal errors of performance and memory as well, are the result of the activity of a sexual factor. That would constitute an *ignoratio elenchi* and accounts for the two major defections from the strictly Freudian school. At any rate for Freud the suppressed desires, the wish fulfillment, the motivation, all these were predominantly sexual in nature from the first days of infancy through the days of early childhood.

At first he limited the cause to an emotional shock of some sort, an attempted rape or seduction in childhood, but this emotional drive was expanded to include impulsive wishes, usually also of a sexual sort. Not only did this sexual impulse either on the ground of an emotional shock but also of an illicit wish fulfillment produce hysterias, phobias, and other psychoneuroses, but the ordinary slips of speech, the occasional defects of speech, like momentary stammering and stuttering, the sudden lapses of

[1] B. B. Bogoslovsky, *The Technique of Controversy*, 1928. *V.* especially Chap. V *et passim.*

memory, social *faux pas*, 'accidental' dropping of articles—all these sprang from the same source. One unique contribution to systematic psychology may be legitimately accredited to Freud: he tried to explain every kind of mental performance whether it was a successful performance or a failure. For centuries psychologists had tried to find out how we *remember;* Freud was interested in finding out how we come to *forget.* Mistakes of all kinds were grist for his mill. Even literary products, wit and humor and aesthetic appreciation, came within the scope of his analysis. Always this analysis ended with the same result.

The sexual instinct is one of the most forceful impulses in all living organisms and one which has been most forcefully inhibited under the restraints of society. It should be noted here that Freud's work probably contributed to the removal of a good measure of linguistic inhibition not only through direct enlightenment on the basis of his theories, but because it became quite decent to discuss Freudianism at all kinds of women's clubs and even in mixed groups! But before his publications even the discussion of sexual subjects was the province only of the professional scientists. Other restrictions were even more imperious and above all reigned social good taste and decency. The conflict according to Freud was inevitable. Since such impulses could not be absolutely destroyed, they could only be subdued by being converted into other forms which could then evade the censor and exert in a transformed manner the full intensity of their activities. Thus the neuroses came about. By retracing these symbols through catharsis the original experience, as an emotional attitude but without fixed objects of reference, is relived at a later, more understanding period of life.

Here Freud makes an important distinction. The experience thus brought up from unconscious levels into the limelight of consciousness is fragmentary and lacks definite references to situations, persons, objects, dates, and other environmental details. If the father or mother was the fixed object of the blind sexual impulse during childhood, when this impulse is revealed under analysis, new attachments are likely to occur through the principle of the *transference* of this energy. It was not enough for the analyst to reconstruct the original story, nor for the patient to recognize it as a part of his own conscious memory, nor even to tear down the old resistances and inhibitions. He must emotionally relive this experience at the present time. At this juncture it is quite likely that a woman patient, for example, will fall violently in love with her analyst. This is what frightened Breuer and he gave up the process. Not so Freud! He allowed this to happen and so do most practitioners who have since followed his methods. Another step is

then required after this transference has been achieved. The patient is then induced to transfer his emotion to other persons or objects which produce a normal adjustment in his life. For this and other reasons Freud advises his followers not only to study the methods in all their details and to gain practice in the use of the methods but also to go through the process of having themselves psychoanalyzed.

We thus see that the biological sex impulse as such is not denied. It is recognized as a powerful aspect in the normal as well as in the abnormal mind. Civilization has made society more agreeable, but only outwardly. Inwardly, if the organism, or more particularly, the neural mechanism, is weak, disruptions of the most pathological kind may result. That it is never very strong is indicated by the interpretation of normal slips of the tongue and other mental and bodily errors in terms of the same irrepressible energy. Freud agrees, however, that since society is constituted as it is, civilization is justified in curbing sexual manifestations in children since in that period preparation has to be made for an inhibited adult life. He is very emphatic, however, in decrying the injustice of enforcing restrictions that mold everyone into a single matrix regardless of individual differences in sexual organization. He gives no final answer, but states that "it is hard to decide" whether civilization has overreached itself in tolerating sexuality "only as the hitherto irreplaceable means of multiplying the human race."[1]

In the later years Freud added still another barrier across which the emotional sex impulse had to pass. Originally the infant is largely homosexual. The libido may become attached to the whole or any part of his body. This narcistic stage is marked by vanity and self-absorption. Later other individuals of his own sex become his chief playmates. In adolescence this changes to the heterosexual type, but traces of the previous type of love fixation remain and produce regressions and even neurotic conditions.[2] In other words the transformation may not always be complete. It is as if, even in regard to the various genetic levels of mental development in the individual, complete forgetting could not occur.

The factors that are therefore continuously in relation to one another in the lower ranges of the primitive organism are comprised in the 'it' or id. This contains all the blind but powerful impulses that persistently seek an outlet but are really part of the organism itself. On this level are all the biologically old drives and urges, including what Freud terms the 'life instincts' and the 'death instincts,' the most potent of which is the sexual impulse (libido). The id is essentially unconscious, is guided by the wants of the body and by the resultant

[1] S. Freud, *Civilization and Its Discontents* (trans. by Riviere), pp. 65–78, 1930.
[2] G. Murphy, *An Historical Introduction to Modern Psychology*, pp. 321–323, 1929.

pleasures and pains. The ego, which presides over the id and keeps it in check through restraints and repressions, is in contact with the real world of external objects and thus provides for the fixations of these drives. The ego may itself become, as in the early stages of homosexuality, the object of fixation of the libido. Through muscular activity and movement, the ego makes peace between the id and the outside world. When disagreement between the two, the inner and the outer, occurs, unconscious repression is in force. But above the ego, which is present in all animals, there is peculiar to man the superego, which embodies all the precepts, ideals, and categorical imperatives which apply to the proper conduct of the ego. In some instances, when special conditions warrant it, the superego may take on a 'parasite.' These formations Freud called "the parasitic doubles of the superego." The 'war superego' was a case in point. This superego allowed practices which the ordinary 'peace ego' would not permit; it also encouraged extreme 'acts of bravery' which were not in the code of the peace ego. War neuroses were successfully explained and cured on the basis of this assumption.[1] Under normal conditions the superego has the power consciously to suppress untoward actions of the ego and to facilitate those that express the personal and accepted social ideals. Both the unconscious repressions and the conscious suppressions result in *sublimations* of the libido in works of art, literature, social functions, and estimable objects of all sorts in a guise that has no evident sexual component. Some of these substitutions and sublimations are so cleverly concealed and camouflaged that the identity of persons referred to in these products is not recognized by the psyche or ego. In that case Freud speaks of surrogate creations.

We must stress throughout these phases of the psychoanalytic doctrine the tremendous affective and emotional drive that is assumed in the mental life at all levels and the destruction of a pathological type which it, like dynamite, is capable of causing, if it is not properly canalized or transformed into acceptable forms of energy. From step to step it is a system which talks a language of its own. Many of its concepts are mysterious from the scientific point of view. The writer heartily agrees with Woodworth, therefore, when he comments:

"For the present, the academic psychologist has a vision of these attractive theories and conceptions surrounded each one by a halo which on closer observation takes the form of a question mark."[2]

[1] O. Fenichel, *Outline of Clinical Psychoanalysis* (trans. by Lewin and Zilboorg), pp. 130–131, 1934.

[2] *Contemporary Schools of Psychology*, p. 181.

There can be no question mark concerning the success with which Freud and his followers have treated many types of psychoneuroses; there is no question mark about the extensive growth of the school; and there is no question mark about the popular interest that the school has aroused in the matter of frankness about sexual problems *vs.* prudery. Many will also say that the validity of the concepts and theories lies in their practical applicability and success. Except as a motivation which supplies the enthusiasms of the practitioners and the analysts, that statement might well be questioned because of the high degree of suggestibility that is involved in the 'talking-out' process. Surely it can be said that Freud built no complete system of psychology and he used no controlled experimental procedures. Nor has experimental psychology or medicine corroborated any of his findings: they could not well do so. But our discussion shows how an emotional drive has been used throughout, in almost complete disregard of intellectual or cognitive factors, to build up an internationally acclaimed method of treating psychopathological individuals.

4. The Phylogenetic Basis for the Psychoneuroses.—It might well be charged that indirectly Freudianism has led to a tendency to remove repressions and inhibitions when as a matter of fact the normal cultured lady or gentleman is a person of quiet reserve and of habitual consideration for the feelings of others. Just being oneself might be excellent training for bumptiousness. In other words, having no inhibitions or repressions might mean having no regard for the rights and opinions of others. Rather than believing that civilization and the civilized individuals in society have hoodwinked others into assuming an artificial attitude which easily becomes pathological in its symptoms, we may believe that we are being led the right way into more natural channels. Of course the process has its experimental vicissitudes: at one time mere form or style of life may neglect or outrun content. An outwardly decent person may be inwardly obscene; so society may grow hypocritical in regard to sex matters and thus itself become mentally twisted.

Perhaps if we view again the developmental procession which we outlined in our phylogenetic theory we may see the pathological disturbances of feeling and emotion in another light. The principle of organization from whole to part on the mental side makes it quite possible for us to retain the earliest form of mere pleasantness and unpleasantness as vague conscious processes. As normal development is ontogenetically repeated by way of brief and synoptic recapitulation, these earliest stages soon become transformed in part to sense-feelings like thirst, hunger, fatigue, sexual impulse, and in fact all the blind

urges that Freud puts into the id. Soon, as the objects and situations appear in the external world, more and more of a cognitive aspect develops, until we find this as a necessary factor in the emotions. First come those that depend essentially on perceptions and then those that revolve more and more about ideas. Variations of both kinds in different intensive and temporal patterns are found also in the passions and moods. Then, as ideas become more and more abstract and are removed little by little from the concrete, the sentiments appear. The feeling life then meets gradually the specialized functions of the cognitive and intellectual life. At times we hark back to feelings of a lower order, but in general the hierarchy becomes established in the individual and he becomes the well-rounded-out and balanced personality with character, individuality, and reputation. His dispositions are well organized as adjustments to a varied environment.

Now, in pathological cases there have been mishaps, delays, and inordinate difficulties in the way of this steadily growing procession. The affective life has been stunted and halted on its march. When this occurs among others who have grown normally in their affective development, complications of many sorts are bound to appear. The sex impulse may be genetically unduly intensive and persistent—that much we may grant to Freudianism as a possibility. But other individuals may have strong sense-feelings—their bodies may be vibrant with urges and sensibilities. This abnormal arousal of organic factors, especially when brought into the focus of consciousness, may delay the usual completion of the process of development as it occurs in the normal man. Others may be arrested at the point of emotional development, while still others may have an overabundance of sentiments—as we recognize in our own 'sentimental' type—and not enough of the balance gained through the solidly built emotions. But when every affection is developed in its right place and in its right amount, when each succeeding step emerges from the previous phase as a specialized instrument capable of functioning better than the wider organization before it, and when the whole forms an integrated hierarchy, other things being equal, the individual is normal and wholesome. The slight deviations, with which we are familiar, still come within the normal range, but when at any place the individual is out of step, serious maladjustments will occur which again work reflexly on the individual and make matters steadily worse. The 'talking-out' method or the re-education procedure, by precept or by example, gradually implants the behavior patterns and mental attitudes of the practitioner into the organism and mind of the patient. Feelings are given their right values and a chance for development is granted. As

we close the discussion of this book additional arguments will be brought to bear from the point of view of education, aesthetics, and social culture.

5. Summary.—We surveyed the field of psychoanalysis with a view to understanding the special function which the affective life has played in this form of psychoneurotic treatment. The combative and dynamic aspects of mental processes had already appeared in the psychology of Herbart. The need for an unconsciousness or a subconsciousness had already been felt in the early part of the nineteenth century. Freud and his followers apparently did not avail themselves directly of the concepts which were worked out by Leibniz, Herbart, and his followers, although as a matter of fact the school of Herbartians was vigorously maintained for a century after its birth. It appears, however, that Freud came upon his ideas independently and largely as the result of theorizing from his clinical practice. Departing from the hypnotists he set up techniques which involved the methods of free association and the analysis of dreams. Materials thus gained early led him to regard all neuroses as phenomena of infantile sexual repression and its close of kin, wish-fulfillment of sexual and related impulses. Civilization had set its barriers against such manifestations, so subtle evasions which developed into still more subtle symbols, which were often more clearly revealed in dreams, ultimately resulted in the distortions found in the psychoneurotic cases. Most clearly these symptoms were found in hysterias.

But the normal individual also manifested such symptoms in errors and faulty actions of many varieties. The symptoms were not aggravated, however, and led to otherwise normal adjustments. The underlying sexual motif was called the libido and functioned unconsciously in the id. The ego provided the contacts with the external world and, in this wise, the fixations for the symbolic behavior of the individual. The superego, which sometimes took on several forms, furnished the personal and social ideals. Repressions and restraints proceeded from the ego and led to sublimations and surrogate creations. Sublimations occur under normal adjustments through products of art and creations of many kinds, and provide us with some of the world's best literature, painting, and sculpture.

Throughout the doctrine we found a most vigorous emotional drive. Desires, wish fulfillments, motivations, drives, urges, and the like stamped the doctrine a 'feeling' psychology, sometimes also called a 'depth' psychology as a protest against a rational intellectualism. The sexual element as the essential core of the system caused major desertions from the Freudian camp in the case of Jung and Adler and a

deviation in their own interpretations. Jung, maintaining that the chief difficulty lay in the adjustments made to present crises, developed the classes of individuals known as introvert, extravert, and ambivert. The second one of these classes was still largely saturated with feeling components. Adler established the concept of inferiority and superiority as a type of mastery or lack of mastery over future situations.

The system was found to be highly theoretical and yet eminently successful over a long period of time. At the close we questioned the value of removing inhibitions unless a middle ground were to be sought in a proper balance between frankness and regard for others. Consequently we pointed out the application of the phylogenetic theory to explain pathological symptoms in terms of an unequal development in the emotional life, so that the gradual emergence of the higher ranges of feeling when it follows the organization from whole to part avoids the pathological pitfalls. Overdevelopment of any one stage in the process arrests the whole and leads to complications through distortions of other mental processes and the emotionally reflex effect of that unusual situation on the individual as a whole.

We might also question the assumption of subtlety on the part of so primitive and blind an entity as the id, or even the ego. The whole system, we recall, is a 'feeling psychology.' But the subterfuges that appear in hiding the real character of the libido are worthy of the astuteness and cleverness of a supreme order of intellect. How is it possible, then, to get the process of camouflaging started—a process that takes the acute mind and long practice of an analyst to unravel? If Freud has ever satisfactorily answered this fundamental question, the writer is unaware of it. To imply it in the general order of nature is probably too much for a present-day naturalist!

Review Questions

1. Briefly describe the historical background of systematic psychology which prepared for the reception of psychoanalysis.
2. To what extent do feeling and emotion enter into the Freudian doctrine?
3. Name and explain three basic assumptions of Freudian psychoanalysis.
4. Distinguish the interpretations of Freud, Jung, and Adler.
5. Make an analysis of one of your own dreams and show the three ways in which distortions may be explained.
6. On what two grounds was hypnosis given up by Freud?
7. Describe in detail the other methods that were then used.
8. Define: catharsis, repression, sublimation, suppression, id, ego, superego.
9. Enumerate the restraints which civilization places on the expressions of the sexual impulse.
10. To what extent would a phylogenetic theory explain an imbalance of the various strata of feeling?

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CHAPTER XVI

DEVELOPMENT OF FEELINGS AND EMOTIONS IN THE CHILD

A mother saw her baby a few days old knitting his brows and said, "He is thinking of grave matters" No, these motions, like all the rest, do not represent a real moral situation until after some time, and they have not at first any psychic causes.

G. Compayré, *The Intellectual and Moral Development of the Child*

1. Feelings in the Earliest Days of Life.—As compared with the lower domesticated animals which are our pets, the cautionary statement made long ago by Compayré has even more weight when we consider the very young child. In the line of genetic development, the child is much closer to the adult human mind than are the lower animals. Yet repeatedly we have had to be on our guard in the matter of overreading the responses of the lower animals. In the earlier psychological approaches to the mentality of the child the same tendency toward overinterpretation appeared. But another somewhat similar attitude also obscured our scientific point of view: the child was considered a sort of vest-pocket edition of the full-grown man. He was smaller yet essentially the same in kind not only as a whole but also in terms of his various mental functions. This argument worked in devious ways. For example, instead of maintaining that the child was capable of reasoning in his own small way, the argument ran that he could not reason at all because he could not reason so well as an adult does. Man, in other words, used to look upon the child egocentrically, that is, from his point of view. This attitude has much changed but we mention it for two reasons, first, because we have learned that the feelings ultimately become involved with other mental processes, especially with the cognitive processes. What the child therefore feels depends more and more on what he cognizes or, in short, on the accumulations of his perceptual and ideational experiences. Secondly, in view of the fact that the main access to the child's, and especially to the infant's affective life is through the channel of his expressions, we may easily fall into the error of comparing those expressions with our own. It is still difficult to believe, is it not, that when a baby cries, he may not be sad or in pain (see Fig. 51)? Only

certain kinds of crying are properly indicative of painful stimuli. Introspective reports are out of order until later childhood, when we may be able to get crude pictures of his feeling life from the standpoint of his own simple comments.

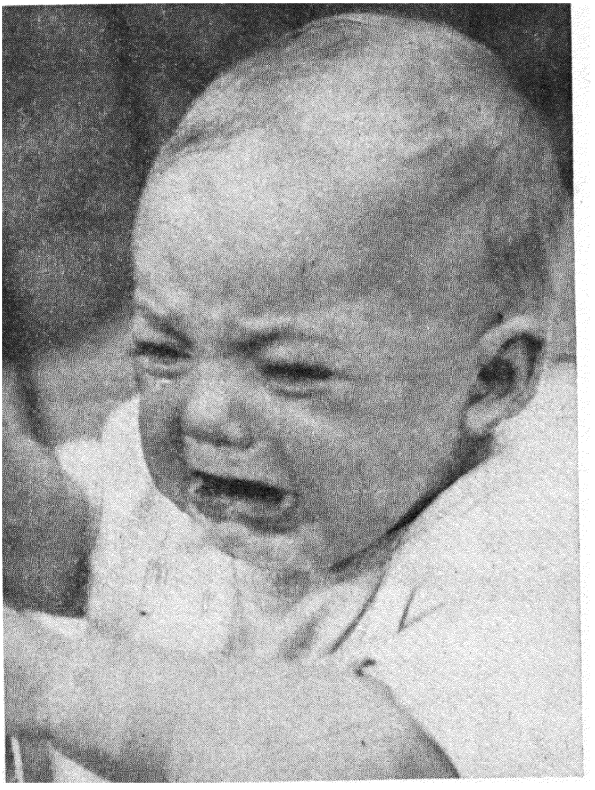


FIG. 51.—Infant, 8½ months old, in distress. The almost closed eyes and the square mouth are especially to be noted here as expressing unpleasant experience. (*Courtesy of Dr. Nancy Bayley.*)

While in the earliest years of growth we are consequently dependent on the response mechanisms for some lead to the child's inner experiences, it is not our position so to define the feelings and emotions that, because this is our only or main approach, these mental processes are to be considered exclusively from that angle. We are still on defensible ground when we say that, from the point of view of systematic psychology, we should be missing the central task of psychology if we went no farther than the bodily responses as such. The task is only begun if we describe the behavioral patterns of the infant. The interpretation of these activities in terms of our broader knowledge, though it be beset with pitfalls, is an unavoidable assignment in a comprehensive psychology of the feelings and emotions.

Keen interest in the early affective life of infants was aroused by Watson's dictum, based on many experimental studies upon infants, that the original feeling life was limited to three emotions, namely, fear, rage, and love.[1] Fear reactions were called out in the first months of life (1) by the sudden removal of support when the infant is fully awake, or by a slight shake or a sudden push when an infant is just falling asleep or is just ready to wake up, or by a sudden pull of the blanket upon which it is lying when the infant is just falling asleep; (2) by loud sounds. The responses include: sudden catching of breath, random clutching with hands, which includes the grasping reflex if the infant is dropped, sudden closing of eyelids, puckering of lips, then crying. All these responses appear at birth. Rage is induced by hampering the infant's natural movements either as a whole or in part. If the face or head is restricted, crying results, rapidly followed by screaming. The body becomes stiff, the arms and hands execute fairly well-coordinated slashing or striking movements, the legs and feet are drawn up and down, and the breath is held so that the face becomes flushed. As the infant grows older the better coordination of the arms and legs results in kicking, slapping, pushing, and the like, which may continue even after the restraint is removed. Even during the first days of life, pressure on both sides of the head, confinement of arms, or clasping of the elbow may produce violent rage. Love is aroused by stroking or manipulating an erogenous zone or the genitals, tickling, shaking, gentle rocking, patting, and turning the infant over on its stomach across the attendant's lap. Crying ceases, a smile may appear as well as gurgling, cooing, and in slightly older children the extension of the arms ultimately resulting in the embrace in still older children.

These reactions are the overtly observable ones. Watson admits that there are many implicit components and that a continuation of the stimulus would produce the paralysis, 'death feint,' and fainting attending strong emotions in man and the lower animals. Thus the reaction patterns would disappear and with them the necessary adjustment to environmental conditions. In general, however, the responses are fairly well organized within a relatively small radius of activity and are accommodated to a definite type of stimulation, but are not directed against a single object in the surrounding situation. While some criticisms have been made against these statements, they fit very well a phylogenetic theory of development from whole to part, as regards their application both to the lack of specialized organization of response on the bodily side and to the want of mental integration involving perceptualization of objects, situations, or events in the outside world. The

[1] *Psychology from the Standpoint of a Behaviorist*, pp. 218–236.

ontogenetic development briefly recapitulating the phylogenetic growth shows at the beginning that the emotions are apparently still concerned with bodily welfare as such and that they lack definite external references. As development takes place, although still retaining a vague subjective component, emotions become more and more outwardly directed, and in the sentiments feelings are attached to abstract qualities attributed to the objects arousing them.

One of the interesting points in Watson's experiments with infants is related to the responses to darkness and to the first sight of furry animals. Before any conditioning took place, therefore, no fear was indicated up to 200 days of life for either of these situations. The Kelloggs similarly reported no behavior patterns related to fear in their child, who was continuously associated for nine months with a chimpanzee. At the beginning of the experiment the female chimpanzee was seven and one-half months old and the male child was ten months of age. Strange movements, like those of kissing, would sometimes elicit a startle, but the child "made no avoiding reactions and subsequently cooed his pleasure." The social attitude and affective behavior was more that of curiosity and interest.[1] Other investigators have generally found the same results when the stimuli were not otherwise conditioned. Watson himself summarizes his later experiments thus:

"These tests on children not emotionally conditioned proved to us conclusively that the classical illustrations of hereditary responses to furry objects and animals are just old wives' tales."[2]

Watson is cautious in his reduction of all patterns of emotional behavior to these three types since his methods were limited and the trials were generally made either in the earliest days of life and with the factors, which would later lead to conditioning, kept under control. Valentine has taken issue on this point because Watson left little or no room in his argument for hereditary factors which would appear only during the maturation of the organism. If we accept the Coghill theory ontogenetically that development goes on progressively from whole to part even after birth, we should expect hereditary influences to be operative for some time to come. Indeed, that is not an uncommon assumption in neurological studies of brain and nerve structures in the human child. At once, however, we become involved in the unsettled discussion concerning the relative weight of environmental and hereditary factors when the date of the appearance of the hereditary traits is postponed after birth. At such a date it is hardly possible to make a clear-cut distinction between environmental conditioning of hereditarily appearing patterns of response. Further retreat into the limbo of 'hereditary tendencies' also precludes pursuit. Valentine admits that loud sounds evoke

[1] W. N. Kellogg and L. A. Kellogg, *The Ape and the Child*, pp. 146–151, 1933.

[2] *Behaviorism*, p. 118, 1925.

fear in most infants a few months old, but he claims that some children show marked individual variations. Such experiences as playing with a mechanical donkey and having a brown paper bag thrust over the head produced definite signs of fear in young children when these experiences were novel and unconditioned. He suggests that the important feature of many isolated stimuli, especially in infants past the first few weeks of life, is the context or pattern into which these stimuli fit, *e.g.*, the presence or absence of the mother or other familiar individuals and objects. Fear of the dark did not appear in children during the first two years; it did appear in two cases at the age of five years. Altogether the results of Watson seem to stand in need of careful and critical review. Even the restraint of movements of the arms performed 358 times in 66 infants failed to arouse defensive reactions except in 2 per cent of the cases. There were either no reactions (59 per cent) or a quieting effect (25 per cent) except in 14 per cent, when flexion occurred.[1]

2. Development of Expressive Patterns of Behavior.—Since we are compelled to diagnose the emotional experiences of children largely in terms of their external expressions, studies of the progressive overt signs of emotion are of particular significance. A detailed record of anger in young children has been made by Goodenough, who found that the pattern of behavior became more definitely organized and directed toward a particular goal. Crying was reported by mothers of forty-five children during a period of a month as the most frequent symptom up to the age of four years, decreasing rapidly thereafter. Screaming was the most frequent expression between two and three years of age. Kicking occurred less often as the child advanced from two to four years of age, but stamping increased in frequency with age. Many other types of behavior, like jumping up and down, striking, throwing self on the ground, refusal to budge, and struggling, appeared as individual differences. With the increasing use of speech, verbal aggressions like refusals, threats, calling names, arguments, and insistences became more common. The responses became somewhat less violent and more symbolic in character and the efforts were in the direction of hurting the feelings of other persons rather than in doing bodily injury.[2] The duration of outbursts of anger showed very little variation with age during the first eight years. There seems to be a marked relationship between the underlying physiological conditions and the appearance of anger: temporary imperfect health like constipation and colds, previous illnesses of at least moderate severity, and

[1] C. W. Valentine, The innate bases of fear, *Ped. Sem. & J. Genet. Psychol.*, 37, 1930, pp. 394–420; K. C. Pratt, A. K. Nelson, and K. H. Sun, The behavior of the newborn infant, *Ohio State Univ. Stud. (Grad. Sch. Series), Contr. in Psychol.*, No. 10, 1930

[2] F. L. Goodenough, *Anger in Young Children*, pp. 66–69, 244–249, 1931.

situations of hunger before meals, are all conducive to a rise in the curve for anger.

Our previous discussions of the complexity which is characteristic of emotional experiences, together with the probability of progressive maturation in the physiological patterns of neural conduction and muscular coordination, incline us to agree with Gesell and Thompson in their statement that some of the investigations involve concepts that have become oversimplified:

"Fear may be an original tendency, but it is possibly subject to the genetic alterations of maturation as well as to organization by environmental conditioning. Such conditioning may determine the orientation and reference of fears, but the mode of fearing may well undergo change as a result of maturation. Fear is neither more or less of an abstraction than prehension. It is not a simple entity. It waxes and alters with maturity. It is shaped by intrinsic maturation as well as by experience, certainly during the period of infancy."[1]

Many of the divergent results in experimental work are probably due to interpretations given by the observers to behavior patterns that are in various stages of development, to say nothing of individual differences in the psychophysiological integrations of response. The terms, anger (or rage), fear, love, and similar names of affective response, need further clarification and delimitation as well as, perhaps, some broadening of scope to include all the variants found in children, the lower animals, and human adults. When more studies are made by experimenters who keep these genetic factors in mind and who also realize the teachings of a growing psychology of cognition, some progress will be made in agreeing to a more definite terminology. If all the workers in the affective field could convene in committee to standardize and describe just what a fear, an anger, and a surprise intrinsically is, both in experiential terms and in behavioral categories, an increasing confusion would not only be stopped but would be supplanted by the beginnings of real knowledge in the affective field. One contribution of such a treatise as this is to bring much of our available material on the feelings and emotions together from diverse directions as a point of departure for future stabilization. In the words attributed to Archimedes (*δός μοι ποῦ στῶ καὶ κινῶ τὴν γῆν*), "Give me a place to stand and I will move the earth," we may point to the largely enriched contributions which would follow if we had 'a place to stand' in the field of feeling and emotion. This holds especially true in the discussion of the genetic development of affective life.

When we envisage the genetic growth of the affective life, it is not only a matter of the development of the respective feelings and emotions, whatever they be, but it also involves very largely the cognitive

[1] A. Gesell and H. Thompson, *Infant Behavior, Its Genesis and Growth*, p 314, 1934.

problem. All the experiences that gradually accumulate in the child's life add meanings with each new return of the same stimulus. Some of our previous discussions, like that concerning Troland's retroflex effect of feeling, apply here. These added significances modify both the experience itself and its behavioral pattern. Someone ought to take the same stimulus or situation and carefully study the modified responses from week to week in the same child. Both the development and the apparent degeneration of feeling could be studied in this way. The environment would have to be carefully controlled, so far as this is possible. As Watson says:

"As long as we can keep the baby under constant observation, a great deal of simplification can be obtained in the study of the emotions, but the human infant is a part of a social group and must sooner or later be returned to it. Things happen so fast then that a separate tabulation of events cannot be made."[1]

It is mandatory, therefore, that the conditioning factors, from whatever sources derived, whether experimentally introduced or accounted for in terms of social, including parental, forces, should be rigorously controlled. Aside from developments that take place by way of maturation from within and aside from the external environmental factors, there is obvious a set of complicating conditions which work in an interrelated fashion between these two sets and form one complex picture of the whole. As in the discussion of the pathological situation, where we traced the pathological factors in a frame of environmental conditions, together with the repercussion from that environment to the sensitive mentality of the patient, so in the child there is a constant repercussion from the environment on the mental functions of the individual.

A phase of this repercussion can be traced through Eng's study of the changes which occur with many different types of presentations in children and adults. Although primarily concerned with the physiological changes in breathing and pulse as lending some support to a phase of the Wundtian tridimensional theory, she found that spontaneously pleasurable emotions are more easily aroused in the child than in the adult with sensory stimuli and that pleasurable emotions in general are more easily aroused in children than in adults.[2] She can not avoid coming to the conclusion that:

"The physiological processes are definitely dependent on the psychical processes, and not the other way round. Mosso comes to the conclusion that the psyche under all circumstances appears to be the slave of matter. For

[1] *Psychology from the Standpoint of a Behaviorist*, p. 227.

[2] *Op. cit.*, pp. 112–113.

my part, I find the strongest reasons to reverse that view, and to say that there is nothing to which matter is more subservient than to mind."[1]

In these carefully planned experiments, in which Eng traced the continued effect of emotional presentations, we have at least a preliminary answer to the repercussion of the environment on the mental situation.

Bridges observed the behavior patterns of fifty nursery-school children for a period of three years. On the basis of careful observation, she proposed a genetic theory which would have as its original undifferentiated basis the common element of excitement. During infancy, distress and delight are added; at the two-year level fear and anger, joy and affection are differentiated out in addition to the rest; and at the five-year level, fear develops further into shame and anxiety, anger into disappointment, jealousy, and envy, distress into disgust, joy into elation and hope, and affection into filial and parental affection. During childhood, adolescence, and adulthood, further ramifications occur. At first the visceral and skeletal reactions are uncoordinated and respond to any kind of gross stimulation. Gradually these become conditioned to certain stimuli and specific skeletal responses are developed as experience accumulates to form the usually recognized emotions. Inherited patterns also play a part. There is considerable individual difference even in the mechanism of visceral responses. When the more or less uniform inherited patterns combine with organized overt responses, then we recognize the common types of emotion proper. Flushing, quick breathing, perspiration, and their analogues are not differentiae of the various emotions: they are common to several emotions. Emotions are more likely to be differentiated by their overt behavioral patterns.[2]

Through empirical observation this theory is really an extension of Dashiell's suggestion that a gradual integration of visceral movements takes place which only indirectly influences the overt behavior of gestural, facial, and other forms of behavior. Habituation to the patterns, recognized as expressions from social usage and thus given social significance, leads to some uniform patterns which constitute the basis for the names applied. While Dashiell speaks of these patterns as acquired, it may still be true, as Bridges intimates, that an ontogenetic process lies in the background of the maturation process.[3] After

[1] *Ibid.*, p. 125.

[2] K. M. B. Bridges, A genetic theory of the emotions, *Ped. Sem. & J. Genet. Psychol.*, 37, 1930, pp. 514–527.

[3] J. F. Dashiell, Are there any native emotions?, *Psychol. Rev.*, 35, 1928, pp. 319–327.

the many decades of prominence given in the literature to the visceral and skeletal reactions of the organism as somehow indicative of different types of emotions and in spite of the hopeful theory of James, Lange, Sergi, and the rest that the key to a newer psychology of the feelings and emotions lay in the permutations and combinations of these physiological processes, we must still say almost half a century later that the dawn of that day is 'not yet.' Woodworth admirably sums up the situation:

"Experimental studies of internal bodily activities, we might say, afford plenty of evidence of emotion, but little or none of the emotions as characteristically different states of the organism."[1]

He made this statement with a slight reservation, as in the case of laughter, but upheld in general the view that emotions are largely recognized and classified in terms of an external situation and the response thereto.

Stratton has also based his developmental scheme on general excitement, which is the main factor of any one of the other emotions. It is the main trunk of the tree of the affective life from which spring to one side the branches of pleasant emotions of elation and affection and to the other side the branches of unpleasant emotions of depression and fear. At the top, together with the other most differentiated forms of affection and fear, stands anger. In this logical scheme the order of development from undifferentiated to differentiated may be chronological: excitement may be the precursor of any or all of the other forms. Excitement may also be the successor to any other form: when an anger dies down, excitement may still be left. It may be the concomitant of all the other forms: but Stratton is not much in favor of this position. Excitement may also be on certain occasions the only form of emotion experienced.

While genetically these proposals are of interest, we must realize that just here in the field of developmental studies we are for the most part at the mercy, as it were, of the expressive procedure. We have commented on this problem before. But at this juncture our dependence comes home to us because terms which we use, like fear, love, and anger (or rage), are the names which we have for several centuries applied to certain social expressions. The whole matter then revolves about a common point and the argument becomes circular. The names are designations of certain well-known overt responses: therefore the certain well-known overt responses give us the names. Since most of the work that has been done on children has been accomplished

[1] R. S. Woodworth, How emotions are identified and classified, in *Feelings and Emotions: the Wittenberg Symposium* (ed. by Reymert), p. 224, 1928.

through the observation of their behavior, the outcome of the application of the above principle is to be expected.

3. The Interpretation of Expressive Behavior.—Having now settled back to realize that the interpretation of children's emotions is probably to be placed more safely into the hands of the expressive procedure, which names the emotion in terms of the external or overt behavior toward an outward situation, we shall be surprised to discover that our comfortable rocking chair can be tipped over backwards! The question now arises, if we are judging the overt responses, how much do we depend upon the response pattern itself and how much depends upon that response pattern as perceived in the total situation in which the response occurs. For example, suppose we see a person expressing rage. Under most circumstances we observe a total picture or scene in which that person is responding to insults and attacks on the part of some other individual, or at least we are cognizant, even in a vague way perhaps, of the provoking conditions. Surely our whole concept of rage has been built up under just such circumstances so that our interpretation of any response to a situation which is not apparent becomes either a puzzle or a laughingstock.

Sherman undertook to investigate the problem as to whether observers could agree in the matter of judging emotional characteristics of infants below eight days of age when the stimulating circumstances were known and when they were unknown. Three sets of motion pictures were provided, one showing both the stimulating conditions and the response and another depicting the responses alone. In the second instance the observers were asked to judge also what stimuli had been used. In a third set the observers saw a film in which the response was shown with a stimulating situation different from the one which aroused it. In the fourth series infants were stimulated behind a screen which was then immediately removed and the observers were requested to name the emotion on the basis of direct inspection of the response. Stimuli included hunger, sudden dropping, restraint of head and face, and pricking with a needle. The graduate students who observed these infants when the stimuli were not shown were unable to attach the expected names of emotions to the responses. Hunger, anger, fear, and pain accounted for 101 out of the total of 119 answers, but altogether 12 emotions were named. Undergraduate students in psychology gave a longer list of 17 emotions but with similar inaccuracies. When the stimuli were shown a much greater degree of success was attained, the undergraduates profiting more in this respect than the graduate students, perhaps because of the greater caution of the advanced group. Even medical students and student

nurses gave a wide dispersion of names, although there were some differences due to individual attitudes. When the stimuli were transposed so that hunger, for example, was shown immediately before the response that had been induced by restraint, all observers voted for the wrong stimulus. Thus the transposed stimulus provided a powerful suggestion virtually overcoming the effect of the response itself in the medical group of students, who may not have been so observant of actual motor responses as are students in psychology.[1]

Although the group of observers who not only saw the responses but actually heard the cries of infants in the nursery situation did no better than those who judged from the motion-picture presentation, there was some question about some stimuli used but not shown and a new set of observers were accordingly asked to judge the emotion from the cry. Again a wide dispersion resulted. The intensity and duration of the cries were important criteria, however, so that prolonged cries were judged as those of hunger or colic and those of great intensity and somewhat prolonged were diagnosed as colic. When the stimulating conditions were known the expected identification was made. When a trained vocalist was employed to imitate various cries, graduate students were able to identify fairly well those of sorrow and anger, but they showed a wide dispersion for the cries intended to depict surprise, fear, or pain.[2]

In a theoretical interpretation of these results Sherman proposes that the inherent character of the various responses expressing emotional experiences in the infant is revealed only in different degrees of intensity. The first responses of infants to simple sensory stimuli are undifferentiated. Emotional responses become more specific with increasing age but are always directed, though often diffusely, toward an adjustment to the stimulating conditions or situation. Again we find some substantiation for an emphasis on a phylogenetic theory which involves an inward maturation toward great specificity in the face of a growing complexity of outward stimulation. Movements may thus by hereditary pattern, according to Sherman, evolve in two directions of rejection or of acceptance. Rejection in turn may involve either retreat or increase in aggressive activity. Later on in adult life conditioning leading to inhibition may greatly modify this type of

[1] M. Sherman, The differentiation of emotional responses in infants, I Judgments of emotional responses from motion picture views and from actual observation, *J. Comp. Psychol.*, 7, 1927, pp. 265–284.

[2] M. Sherman, The differentiation of emotional responses in infants, II. The ability of observers to judge the emotional characteristics of the crying of infants, and of the voice of an adult, *ibid.*, pp. 335–351.

behavior.[1] Partially fitting into this scheme are Bühler's observations with a large number of infants. In the first weeks of life he distinguished four different expressive movements, crying, smiling, head deflection as avoidance, and pursing of the lips. The screaming type of cry was present at birth and weeping was added after the third week. Although before this the expression which Preyer called contentment also appears, the true smile was not evident until about the third week. The pursing of the lips is a modification of the sucking expression and is aroused when an object touches the lips of a hungry infant and is then withdrawn. Later the pursed lips accompany any attitude of attention. Facial grimaces elicited by sours, bitters, and sweets were also present at birth.[2] The later emotional expressions are developments of these fundamental movements.

Koffka believes that imitation plays an important rôle in building up the various parts because perception and movement are closely correlated, each on its own level reaching its own completion or configuration through dynamic stresses. A state of equilibrium of inherent forces is attained only when both the perception and its accompanying complexly coordinated movements have arrived at the goal of completion. The degeneration and development of a few of the typical emotions have occupied the attention of several of the investigators who envisaged these phenomena from the Gestalt point of view. We select two of the problems by way of illustration. Karsten asked her observers to do monotonous tasks, like filling pages upon pages with pencil dashes, clusters of separate vertical strokes, weaving lines in and out of rows and groups of small circles, for an hour or more at a stretch until they refused to continue. Introspective accounts made by the observers and notes made by the experimenter were recorded during the process of urging them to continue beyond the point of mental saturation. It appeared that the problem did not involve either physical fatigue or mental lack of interest in the inherent sense. The observers were ultimately blocked because they just could not go on. The same task could easily be continued if it entered a new 'field' of forces, *i.e.*, if the performance was involved in a new context or set of significances which involved new object relations.[3]

In a similar manner Dembo made a qualitative analysis of spontaneous utterances on the part of observers who were driven to do difficult

[1] M. Sherman, The differentiation of emotional responses in infants, III. A proposed theory of the development of emotional responses in infants, *J. Comp. Psychol.*, 8, 1928, pp. 385–394.

[2] K. Bühler, *Die geistige Entwicklung des Kindes*, 4th ed., p. 86, 1924.

[3] A. Karsten, Psychische Sättigung, *Psychol. Forsch.*, 10, 1927, pp. 142–254.

and finally impossible tasks. In one series they were obliged to throw ten rings in succession over the necks of bottles which stood too far away to allow anyone to succeed. Since setting up of the bottles and gathering the rings for the next throw took too much time, as an interval, for the continuous development of the various stages of anger, a task was set to reach for some potted flowers that stood outside of a marked area within which the observer had to keep his feet. To accomplish the feat, there were two solutions: the observer could rest his body on one hand with his feet still within the boundary and grasp the flower-pot, or he could use a stool, which was provided him, to rest the upper part of his body upon and then reach out with the free hand. Having accomplished this task without suggestions from the experimenter, the latter then announced that there was still a third solution when such did not exist. Notations of the observer's remarks and attitudes were carefully made verbatim. The relationship between the observer and experimenter, the persistence and application of the observer in relation to the goal, the reality of the goal, the development of various 'fields' into which the task fitted were carefully analyzed. The task itself showed a variety of underlying drives, since in no particular was there a continuously uniform principle or method of progress. Factors in the emotional complex, which were emphasized from time to time, were bland obedience, search for sympathy, rudeness toward the experimenter, irony, earnestness, sulkiness, threatening attitudes, walking nervously about, sitting still, fight, play, revenge. All these were centralized about a provocation leading ultimately to what is generally called anger.[1]

Koffka summarizes the situation by pointing out that, from the Gestalt aspect of fields of forces, a number of transitions are possible from one field to another. The field may be that of the object itself (intra-object forces), that of object in relation to another object or objects (object-object forces), that of object to ego or ego to object (object-ego, ego-object), or that of the personality itself (intra-ego forces). Oscillation from one field to another is momentarily possible and results in renewed energy toward the completion of a task. Koffka does not feel that empathy is a serviceable concept, because 'feeling into' a situation does not express the varieties of dynamic relationship that have been discovered.[2]

In a more extended manner, Lewin emphasizes the degrees of tension which culminate in an emotional outburst. In the study made by Dembo

[1] T. Dembo, Der Ärger als dynamisches Problem, *Psychol. Forsch.*, 15, 1931, pp. 1–144.

[2] K. Koffka, *Principles of Gestalt Psychology*, p. 400–416, 1935.

the final stresses came to their highest pitch when the forces from the task assigned were met by the impossibility of the solution and when the ego was shut off from the outward field. The 'positive demands' of the instruction were met by the 'negative demands' of the situation. Lewin indicates that in such a situation there sometimes is "a strong tendency to go out of the field by fleeing from the plane of reality into that of unreality." This field of unreality takes on different forms, such as that of dreams, of the imagination, and of gestures. Here "dynamically there is a lack of firm boundaries and a large degree of mobility."[1] This is in substantial agreement, of course, with Koffka's theory that "the total field is permeated by forces which either hold it in equilibrium or produce change and action." The ego may thus become a 'sub-system' in such a total field.[2] Koffka interprets the three possible types of emotion which Cantril and Hunt found with the injection of adrenalin as amenable to this form of reorganization of fields. When there is a 'cold' emotion the forces, charges or tensions are within the field of the object, when there is a pseudo emotion, the ego becomes only slightly charged; and when the emotion is real and fully felt, the charges are within the field of the ego itself.

This is a long distance away from, but is suggestive of, the three emotional attitudes which Marston found in one hundred children ranging in age from two to six years. By means of rating scales, laboratory and everyday performance, and observation under social conditions, he was able to classify them reliably into introverts, extraverts, and ambiverts. The boys were significantly more extraverted than the girls and a decrease in extraversion became apparent with increase of chronological age in both sexes but more so in the case of the girls. Even in terms of the output of directed energy the extravertive form of emotional attitude corresponds in the rough with the 'object' type of field, the ambivertive form with the 'slightly charged' type of ego-subsystem, and the introvertive form with the 'fully charged' ego-subsystem.[3] That there is also some possibility of reaching a more adequate understanding of emotional disorders in children by some such interpretation is gleaned from the independent study of Doll, whose long experience with such cases is summarized by the statement that "they occur most frequently in those periods of readjustment when the child is progressing from one stage to another toward

[1] K. Lewin, *A Dynamic Theory of Personality* (trans. by Adams and Zener), 1935, p. 145.

[2] *Ibid.*, p. 405.

[3] L. R. Marston, The emotions of young children, *Univ. of Iowa Stud. in Child Welfare*, 3, 1925, No. 3, pp. 1–99; *V.* also G. W. Hartmann, *Gestalt Psychology*, Chap. XIII, 1935.

achieving ultimate independency."[1] This opinion is fairly generally held among those who have studied the behavioral patterns of adolescent children.[2]

We thus discern a pattern of development in the human infant and child which covers many possibilities. The probability is that, through the use of the expressive procedure manifestations of affective behavior occur in the earliest days of life, but since we are largely governed in these observations by the total situation in which these manifestations appear, we have to be continually on our guard on two counts: (1) we must not too hastily suppose that the actual experience matches the outward expression any more than crying at birth should be interpreted, not as a symptom of mental distress or physical pain, but as a healthy exercising of lung and vocal power—the chief outlet, in other words, of physiological energy; (2) we must not infer that the pattern of overt expression is indicative of any one of a large number of feelings and emotions, because without the full envisagement of the entire situation such interpretations have proved to be quite fallacious. All that we can at present say is that there are probably biologically inherited dispositions toward expressive movements, which dispositions are manifested (1) only when the organismic structures and functions are properly matured in the body of the individual, (2) when mental characteristics, like the growing perceptions of objects, situations, events, relations between objects, events, and the like, and the self are equally ripe to be incorporated in the growing feeling life as portrayed in our phylogenetic theory, (3) when the stresses and strains reflexly returned to the organism from the environmental situation begin to take effect, and, (4) when the social inhibitions and facilitations of a civilized culture through present and future rewards and punishments are continuously operative in the development of these inherited tendencies.

4. The Results of Impressive Procedures.—The most frequent type of investigation has had to do with the expressions of feeling and emotion. Many researches have taken account, however, of the way in which children have stated their preferences for colors and for many other items of higher aesthetic interest. After summarizing a large number of studies concerned with the reactions of children of varying age, race, and cultural background, Guilford comes to the conclusion "that in spite of differences in experimenter, color material, method of measurement, age, race, and sex of the subjects, the order of preferences

[1] E. A. Doll, Emotional disorders in children, *Amer. Rev.*, 4, 1926, pp. 61–69.

[2] A. F. Bronner, Effect of adolescent instability on conduct, *Psychol. Clinic*, 8, 1915, pp. 249–265.

for the different hues is a rather uniform phenomenon." He had already pointed out that "children of school age do not differ very much from adults in their preferences."[1] This is a general statement that does not overlook minor variations in the scale of preferences which are due to differences in brightness or saturation and in the size, shape, and background of the color stimuli and to some extent to the age and education of the subjects. Some of this ground we have covered before. The general order shows that reds, blues, greens, violets, oranges, and yellows are preferred in the descending order given with minor exchanges of places in the series. Staples, who equated the colors for tint and saturation, perhaps came nearest to showing the developmental changes that take place. The results follow:[2]

Infancy to 2 years	R Y G B
2.5 to 5 years	R G B Y
7 to 12 years	B R G Y
College students	B G R Y

Thus yellow sinks to lowest place after two years of age and red gradually follows in this trend. Red seems to be preferred in the highest ranks chiefly by children of foreign countries and by other than white races.

On a higher aesthetic level several studies show that children of preschool ages prefer objects arranged in a balanced relation to one another rather than in an unbalanced relation. Such a characteristic as sensitivity to the unity of design or the arrangement of objects is rarely found below the age of four. With allowances made for a wide variation in individual sensitivity, artistic unity is perceived more and more definitely as adolescence is reached. Girls are slightly more sensitive than boys in this respect. In tests made on 600 children very little appreciation of color harmony was definitely found until about the eighth year. By the twelfth year progress toward a level comparable to the sensitivity of the adult still is under way, although a 'leveling off' is evident.[3] We notice that the aesthetic appeals of sensory stimuli are the earliest evidences of the affective life and that as the mental processes mature the more abstract qualities of relationship, balance, harmony, and the rest gradually emerge. The latter

[1] J. P. Guilford, The affective value of color as a function of hue, tint, and chroma, *J. Exper. Psychol.*, 17, 1934, pp. 342–270.

[2] R. Staples, The responses of infants to colors, *J. Exper. Psychol.*, 15, 1932, pp. 119–141.

[3] For a detailed study of artistic appreciation and performance in children of preschool ages and later years, *V.* N. C. Meier (ed.), Studies in the psychology of art (Univ. of Iowa Stud. in Psychol. XVIII) *Psychol. Monog.*, 45, 1933, No. 1.

have to wait upon the further development of abstract ideas and sentiments which according to the phylogenetic theory are on a progressive scale of evolution, duplicating in the child what has already occurred in the race.

In a report of a questionnaire study concerning the aesthetic judgments of children, Bulley draws some tentative conclusions concerning the genetic growth of aesthetic appreciation. The study does not claim to be scientific and the basis of scoring is not clearly indicated. Photographs of all sorts of objects were used, such as bookcases, armchairs, coffee-pots, voiles, embroideries, wine glasses, jewels, and tea-pots. The basis of aesthetic choice indicates that the young child utilizes imaginative factors. As he grows older materialistic and practical demands enter the aesthetic picture and later a more critical and evaluative attitude is assumed Boys tend to emphasize more than girls the object's fitness for a certain purpose. The influence of teaching and training is mentioned. It is fruitless to try to carry our analysis further psychologically on the basis of a study that was obviously not scientifically controlled.[1]

Brian and Goodenough have discovered some remarkable differences in the affective appeal of objects where color vied with form as the basis of selection.[2] Using some 474 subjects ranging in age from children under two years to adults, they found that below the age of three years form rather than color was the basis of selection, but at about the age of three a preference for color was manifested. By the age of six form again became the dominating factor and steadily gained increasing emphasis from six years of age to the adult level. The peaks in the curve occur at the ages of two to two and one-half years, when 84 per cent of the choices were made on the basis of form and only 16 per cent on the basis of color; at four to four and one-half years of age, when 75 per cent of the choices were made on the basis of color and 25 per cent on the basis of form; and at the adult level, when form accounted for 90 per cent of the choices and only 10 per cent of the judgments were based on color.

There is some question concerning the interpretation of these results. The instructions to the subjects may have been differently interpreted in connection with the objects perceived at the different age levels. Again, children as they grow older may be increasingly influenced by the suggestions from older people derived from contacts in daily life. A more plausible assumption seems to be that as one becomes older the discrimination of objects in terms of form develops more steadily in terms of pattern or shape. Color may, therefore, have an inherent

[1] M. H. Bulley, An enquiry as to aesthetic judgments of children, *Brit. J. Educ. Psychol.*, 3, 1933, pp. 162–182.

[2] C. R. Bryan and F. L. Goodenough, The relative potency of color and form perception at various ages, *J. Exper. Psychol.*, 12, 1929, pp. 197–213.

attraction between the ages of three and six. By the latter time, however, the child has learned that such objects as houses, horses, cows, books, and the like are more distinctive in terms of form than of color. All told, the aesthetic appeals of form and color were not distinctly or at least continuously stressed in this experiment.

Another instance, but of the same order, comes from a study which Gates made in the recognition of facial expressions with the advancing years of school life. She found that

> "More than half of the kindergarten children understood the laughter picture, more than half of Grade I the pain picture; Grade III anger; Grade IV fear; Grade VI surprise or wonder; and the portrayal of scorn is understood by 43 per cent of Grade V."[1]

She used the Ruckmick set of photographs and asked the children to name the portraits as they were shown. Making some allowance for synonymous or equivalent expressions, the results showed continuous progress in the direction of perceiving and comprehending the more socialized or derived emotional expressions. Out of ten pictures shown, the following average results were obtained:

Av. age	7.5	8 5	9.5	10.5	11 5	12.5	13 5	Adult (college)
Av. no. Recognized	3 9	4 7	5.1	5.6	6.4	6.7	7 6	8 9

Here again we note that the cognitive factor is basic to emotion and that, until experience has furnished the background of meaning from concrete instances to abstract qualities, certain expressive signs and symbols can not be fully appreciated. Only when we ourselves have entered the responsibilities and actualities of parenthood can we fully understand and appreciate such an emotion as parental affection.

There are many other approaches to the problem of emotional development, notably those which observe the modifications of affective behavior with increase of age. Beginning with the process of conditioning infantile responses to various unusual stimuli and extending the process of social inhibition, many studies reviewed by M. C. Jones have shown that environmental factors are strong components in the developing affective life.[2] On the other hand, an equally impressive series of studies increasingly point to the part played by maturation. H. E. Jones maintains that the manifestations of emotional response are "related to the stage of development of those mechanisms which are concerned in determining the proportion of

[1] *Op. cit.*, pp. 449–461.

[2] M. C. Jones, Emotional development, in *A Handbook of Child Psychology* (ed. by Murchison), Chap. VI, pp. 271–302, 1933.

somatic and of visceral discharge." He found that the electrodermal response of infants "is smaller and less easily aroused than in older children." In general the overt response is inversely related to the implicit responses of the organism, such as the electrodermal response. The 'surface' discharge may even imply a 'lack of visceral reinforcement.'[1] Maturation also implies a mental development. Bayley found that the negative reaction to strangers increased up to about ten months of age with the growth of intelligence during those months. 'Strangeness' was thus a matter of increasing perceptual experience rather than an inherited disposition.[2]

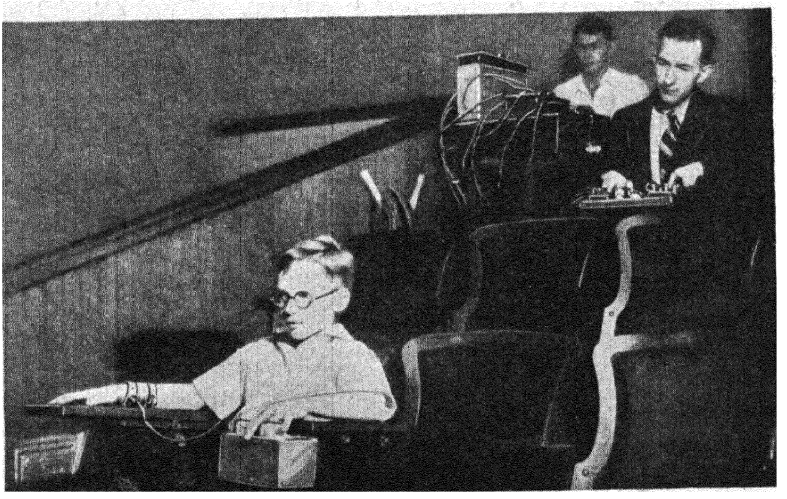


FIG. 52.—Taking the electrodermal response of children in the motion-picture theater. Two fingers of the left hand are immersed in the electrodes. The wrist band of the pneumo-cardiograph is around the right wrist. The control-board is operated by one experimenter and the Wechsler psychogalvanograph with the other experimenter is in the far background. (*Courtesy of The Macmillan Company.*)

Some such explanation is also in order in the Dysinger-Ruckmick study of the emotional effects of the motion pictures on children. A series of preliminary experiments were run in the laboratory with silent motion pictures using eighty-nine subjects distributed as to age in six groups from below eleven years of age to adults over twenty-five years of age. The photographic recording of the electrodermal response provided the principal technique and comments of the observers were systematically noted. In the theater where the regular showing of sound pictures was provided, sixty-one subjects in three age groups, ranging from an average of nine years to an average of

[1] H. E. Jones, The galvanic skin reflex in infancy, *Child Devel.*, 1, 1930, pp. 106–110.

[2] N. Bayley, A study of the crying of infants during mental and physical tests, *J. Genet. Psychol.*, 40, 1932, pp. 306–329.

twenty-two years, were available. While again individual differences in all the age groups were revealed, we found that there was a declining emotional response to scenes of pseudo tragedy, conflict, and danger with the advance in age and a consistently marked response to scenes of love-making and of sex interest during the adolescent period. In the older group the emotional appeal to the latter type of scene was modified by factors involving critical judgment as to dress, type of acting, and the outcome of the plot. For the younger children the sequence and relatedness of scenes was not a controlling influence; each scene and episode was largely complete in itself and the response was much more suffused with emotional than cognitive factors, at least those involving abstract judgments. The principle of the 'adult discount'—a partial inhibition of sensorily perceived situations through ideationally conceived possibilities—was particularly helpful in interpreting the reduced emotional responses of our subjects in the higher age brackets.[1]

This, then, is in line with the general thesis of this book. Not only must we take the *cognitive* factor into account, but we must ask *what kind* of cognitive factor is incorporated in the emotional experience. As the individual advances in experience and also in mental maturity, the abstract connections and relationships between things often become more interesting and affectively colored than the plain pleasantness and unpleasantness of sensory impressions and of concretely perceived, though exciting, objects. At least if it is still possible to enjoy such experiences as the taste of certain beverages, the 'feel' of certain smooth and soft substances, the sound of certain rich chords, and the sight of a variegated landscape, it is also possible to enjoy in the cultivated adult mind the subtlety of a sly thrust, the quick flash of repartee, and the sudden twist of an anecdote. In other words, added experience with the growth of the mental life is not enough to explain the normal development of the feelings and emotions; it is also necessary to trace the growth of mental processes from the point of view of increasing maturation, such as the development and more persistent use of ideational material and the rôle of abstract meanings from concrete instances.

5. Summary.—In our survey of the feelings and emotions during infancy and childhood, we have shown some of the handicaps which the procedures of expression and impression present to the investigator. Since introspective comments may be added only in childhood, we must not overread the data which the expressive procedure makes available during the days of infancy. The strictly behavioristic approach to infant behavior during supposedly emotional episodes paved the way to further research, which has apparently shown the

[1] *Op. cit.*, pp. 110–119.

unreliability of observing isolated expressions of infants without also taking the total situation into account. It is further evident that hereditary equipment can not be presumed to terminate during the first few days of life: inheritance does not mean 'to be born with' in the sense that *at birth* you either have something or do not have something which is in the nature of unlearned response. The maturation process can go on along hereditary directions during the whole process of development. Hence we have discussed how the feelings and emotions have waited upon the growth of other mental processes with which they are affiliated, especially the cognitive functions but also the conative functions, which involve movement and performance.

There is no doubt that fear, anger, and love are in some sense basic biologically primitive emotions and that Watson did much to make the observation of infant behavior possible. His observation of the rather aimless direction of these emotions and of their orientation to bodily welfare is rather opportune in the light of a phylogenetic theory which allows an ontogenetic recapitulation of original characteristics to take place. His insistence that many traditionally assumed reactions of the young child to darkness and to furry animals are conditioned responses of a learned type has also had considerable confirmation and a wholesome influence.

The place of the visceral and muscular groups of responses is such that we can not acknowledge any definite pattern for each one of the feelings and emotions. Large individual differences exist and it is furthermore likely that these responses are inversely related to the overt responses, unless the latter undergo inhibition. It is plausible, however, to trace the expressive movements to original matrices, like crying, smiling, pursing of lips, and head deflection. It is possible, too, either to differentiate various expressive stages from an original base, as Bridges has done, or to develop a number of dynamic fields, as is done in the Gestalt doctrine. Some of the most significant work has been accomplished through the process of watching the gradual progressive and degenerative stages of emotions under laboratory conditions.

The really fruitful endeavor of the next decade should be directed toward picking up the very definite trends which have heretofore been suggested and working them out in great detail in the support of some attractive developmental theory, which in turn may have its shortcomings, but which will supply the blueprints of a structure that is concrete. The experimental facts thus far accumulated tend to support such a theory: the procedure of impression has shown that there is fairly good agreement in the liking and disliking of colors; the

expressive procedures have demonstrated that we can not utterly rely on mere bodily expression and must take into account the cognitive and conative factors on the mental levels; and the studies on aesthetic appreciation have demonstrated the greater variability of feeling on the higher levels of sentiment. A completely organized theory then takes cognizance of such developmental stages on the mental side and tries to find the neural correlates for these data. Bodily expressions will be better explained if the neural mechanisms are first put in order. While we can not therefore at present be wholly optimistic in the envisagement of the facts at hand, neither can be we wholly pessimistic. The condition is wholesome: all is not well with the psychological world of the feelings and emotions, but that world is not sick either. We are simply taking a fair inventory of our stock in trade. In this connection we, therefore, agree with a famous saying of the psychologist Ebbinghaus, "Science must prefer the admission of honest poverty to the appearance of wealth."

Review Questions

1. What two tendencies obscure the scientific observation of children?
2. Name the stimuli which according to Watson aroused the three basic emotions in infants and describe the responses made in each case
3. State the case of maturation *vs.* Watson's position on inheritance of emotional responses.
4. In some concrete instances illustrate the 'repercussion of the environment,' following one emotional response, on the experience of an emotional sort on a subsequent occasion
5. Draw the Bridges scheme of emotional development in the child.
6. Outline the results which Sherman obtained in the recognition of emotions from the expressions of infants
7. Apply the Gestalt doctrine of various 'fields of forces' to some new situation in your own experience
8. Take any typical emotional response of children and show how the cognitive element may alter the emotion experienced.
9. What apparent changes occur in the affective response to color with the advancing years of childhood?
10. Criticize the statement: "The overt and implicit responses of childhood afford an adequate picture of a specific emotional experience."

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CHAPTER XVII

FEELING AND EMOTION IN THE ANIMAL MIND

Dogs, as you of course know, manifest very pronounced likes and dislikes. If two poodles, *e.g.*, are kept in the same house, there may spring up between them a kind of friendship; the survivor mourns the loss of his comrade

W. Wundt, *Lectures on Human and Animal Psychology.*

1. Observation of Emotional Expression.—In the animal field we are, of course, entirely limited to the procedure of expression. This had been the traditional approach even before the time of Darwin. For the reason that we have no access to the actual experiences of the animal mind, safeguards have had to be thrown about the interpretation of the results obtained. The principle of the parsimony of hypotheses, classically known as Occam's razor, has led to the well-known 'canon of Morgan,' which is stated as follows:

"In no case may we interpret an action as the outcome of the exercise of a higher psychical faculty, if it can be interpreted as the outcome of the exercise of one which stands lower in the psychological scale."[1]

This cautionary statement was directed against what Washburn calls the *method of anecdote.*[2] Even so great a psychologist as Wundt, she points out, described the behavior of a spider in a fairly unscientific manner, especially since the anecdote was a recollection of childhood.

But if the procedure is cautiously used, and especially if the situations in which the observed behavior occurs are carefully controlled, there is no reason why many data of interest to students in the field of feeling and emotion should not be accumulated. In each case, as before, we have to make inferences from the known experiences in man and the accompanying behavior pattern. This means also that the place which the animal studied occupies in the evolutionary series must be rigorously kept in mind. The canon of Morgan therefore signifies that in terms of all possible inferences such as those derived from available organic structures, state of neural development, types of movements, field of activity, and the like, conclusions must not be overdrawn. If the animal, for example, has not yet reached the stage

[1] C. L. Morgan, *Introduction to Comparative Psychology*, p. 53, 1894.

[2] *The Animal Mind*, 3d ed., p. 4, 1926.

of development involving the integration of sensations into patterns as evidenced by the lack either of a sensorium physiologically capable of rendering such organization possible or of a neurological framework equipped to favor integration, then that animal will not be able to experience emotions as we have defined them. If, within the bracket of emotion, we include an experience which requires 'free' imagery or ideas, such as in the event of an apprehension, we must again not assume that a situation which elicits that emotion in man, even if the behavioral pattern is suggestive of apprehension, actually calls out this particular emotion in the animal concerned. Authorities are inclined to deny the presence of such ideas in the lower animal mind.[1] These are instances which will bear on the problems of feeling and emotion as we proceed in our presentation of the subject.

It should not be necessary to repeat here the discussion of the presence of consciousness in minds lower than ours in the scale of evolution. This we covered in the chapter on the phylogenetic theory. We need only recall that there still seems to be an honest difference of opinion on the subject. In the writer's judgment, however, the position that consciousness as such does not appear in these animal forms or the claim that such a supposition is scientifically unwarranted is each untenable. We should either have to assert that there is an abrupt change in the evolutionary series between man and the lower animals in this respect or that the scientific treatment of conscious processes of any sort has been of no account.

In view of the present status of psychology—while much progress is still hoped for in the quantitative treatment of some of the higher mental processes—we are compelled to take the position that a recognition of the fundamental fact of consciousness is in order. This has been the attitude of the writer from the beginning of the book and is the fundamental tenet of the phylogenetic theory which threads its way through the discussion. At the same time, especially in this section, where animal behavior is the important consideration, a fair summary must include those points of view which differ widely from an introspective account. Behavioristic concepts flourish principally in the area of child and animal psychology. Many ingenious techniques have been contributed by behaviorism to the science at large; a large number of experimental results have been derived from these techniques.

Since the critically conceived and unanswerable arguments of Descartes provided psychology with its Magna Charta, from the angle of a systematic presentation particularly on a comparative basis, the factor of experience can not be left out of the picture. Experience

[1] M. F. Washburn, *The Animal Mind*, p. 251.

exists, if anything in the world exists. Even experimental research founded on a behavioristic premise could not, as we have seen, leave cognition out of feeling when distinctions had to be drawn between cold, quasi, and real emotions. Elsewhere when a description of the situation and the recognition of overt and implicit responses both failed us by way of adequate diagnosis, our only recourse was to the comments of the observer as to what he really experienced.

2. **Simple Affective Experiences.**—There can be little question concerning the fact that, granting consciousness to even such simple forms as the amoeba and the paramecium,[1] there is present a vague form of pleasantness and unpleasantness in these lower animals and from this point on up the scale of biological development. Only here we must beware of equations with even the simplest phase of the affective life found in man. Washburn specifically states that comparisons must follow the path of negating all richness of quality which may inhere from organic thrills and bodily reference due to any somatic resonance. It is only "remotely suggested by our own vague, diffused sense of bodily well-being or ill-being." It must have no sensory reference to objective relations, because anatomical structures differentiated to give these qualities are entirely wanting in such animals. But from this point on through the gradually ascending series of evolution we must still be able to attribute mere pleasantness and unpleasantness to animal behavior in connection with situations in natural life which indicate the positive impulses of forward movement and expansion and the negative impulses leading to avoidance and contraction of organismic behavior. The lowest order of movement here involved is tropistic movement. Where in natural life such minute animal forms become parts of a larger organismic whole, like the bacteria in the digestive tract and the constituent mobile cells of the blood in man, even there we can not on this hypothesis deny the affective process in its lowest phase, although to some persons the situation may thus seem to be ridiculous. Certainly in those laboratory experiments on learning where pleasant and comfortable environmental stimuli are provided as positive inducements and unpleasant and painful stimuli are applied as punishments, the same affective responses must be inferred.

These affective processes, Watson admits, provide one of the two stumbling blocks "in the way of our main thesis,"[2] and the manner of his climbing over this stumbling block is not at all graceful. He converts affection into

[1] M. F. Washburn, *The Animal Mind*, pp. 44 ff.

[2] J. B. Watson, *Behavior; an Introduction to Comparative Psychology*, 1914 pp. 21 ff; this practically a reprinting of the article: Image and affection in behavior, *J. Philos. Psychol. & Sci. Meth.*, 10, 1913, pp. 421–428.

the responses of the sexual organs by way of tumescence and shrinkage, into the tonicity of muscular structures by way of contraction and relaxation, and into the rate of secretion of glands by way of increase and inhibition. The erogenous zones are the primary sources and the entire mechanism is one of adjustment. Since amoeba and other simple forms can not have responses of this order, Watson simple removes them from the evolutionary generalizations. The "laws of behavior in amoeba . . . must be determined and evaluated in and for themselves, regardless of their generality, or of their bearing upon such laws in other forms. . . . "

Tolman is able to circumvent the situation only through the erection of a cumbersome structure of terms which defies abbreviated description and is not in the least devoid of introspective symbolism.

"*Pleasantness.* Our doctrine will be that pleasantness is, first of all, the release of a sign-gestalt-expectation, *i.e.*, the release of an expectation to the effect that the presented object or situation is a sign of something 'good,' *i.e.*, of a final physiological quiescence. Pleasantness is thus, first of all, an assertion that staying in the presence of, or having some other type of positive commerce-with, the given, presented object, or situation, will lead on to physiological quiescence.

"*Unpleasantness.* Turn, now, to unpleasantness. In it, just the opposite situation obtains. Unpleasantness asserts that the immediately presented object is a sign that something 'bad,' *i.e.*, a final state of physiological disturbance, will come as a result of having commerce-with such a sign. But, again, there are two subordinate features to be noted."

It is further indicated that neither of these definitely "assert just what the ultimate type of this quiescence [or disturbance] is going to be—whether, that is, the given commerce-with is going to satisfy food-hunger, sex-hunger, excretion-hunger, aesthetic-hunger [for unpleasantness the examples are: injury, balking of other propensities] or what—only that some sort of *good* quiescence [or *bad* disturbance] is to be reached." Only in the case of the emotions proper are the 'assertions' as to the precise natures of the coming 'goods' or 'bads' given. The mental states involved are nothing more than the resulting 'sensations' of the organic and kinaesthetic classes which are involved in the form of incipient visceral and skeletal activities. Conscious processes are therefore not excluded in this system but "any accurate introspection on the 'sensations' of pleasantness and unpleasantness is very difficult."[1] Not only do we have, therefore, an inclusion of conscious processes in this scheme of purposive behaviorism, but we also have such consciously impregnated terms as 'expectation,' 'good,' 'bad,' *etc.*

Other investigators in the field of animal psychology, some of whom are behaviorists, like Weiss, and others modified behaviorists like Hunter, have usually ascribed affective processes to the lower animals.

[1] E C. Tolman, *Purposive Behavior in Animals and Men*, pp. 259–268, 1932.

Feeling, for Weiss, is a relationship between temporary and permanent patterns of behavior.

"In pleasantness some new response supplements, and in unpleasantness some new response interferes with the general coordination of movements, —provided this supplementation and interference does not arise as a mere increase or decrease in the energy of the responses already occurring."[1]

Since Weiss put this on a sensorimotor basis, it is doubtful whether he took the position of ascribing it to animals, like the amoeba, without a nervous system. In places he seemed to slip from a strictly behavioristic approach since he spoke of adjustments being "at first unpleasant" and since he asked the question, "Is it pleasant or unpleasant?"[2] Later on he implies that these may be "verbal descriptions of the type, 'I like this,' 'I do not like that,' etc."[3] Under no conditions, strictly speaking, however, would Weiss include the conscious process of feeling to remain in his systematic presentation. Hunter, on the other hand, is not so uncompromising, since at least in his earlier writings he admitted pleasantness and unpleasantness as an affective process of the conscious variety,[4] although he gave no intended treatment of it in the chapter on animal psychology. Later on he separated psychology proper from anthroponomy. The former regards experience from the traditional point of view of consciousness and pursues its quest, with perhaps somewhat doubtful results, on the basis of indirect approaches; the latter takes the direct line of attack on the stimulus-response situation and leans heavily on the affiliated sciences of physiology and biology.[5] In still another article he assigns to psychology those physiological approaches which can be referred to consciousness.[6]

Some of the earlier writers, like Morgan, quite freely grant feelings to the lower animal forms. He says:

Sufficient has now been said to indicate—but scarcely more than indicate —the importance of feeling-tone, interest, and emotion in determining the nature, character, and effective energy of the conscious situations which arise in the course of animal behavior. They largely influence, and in part direct, the course of the conative tendency. But they also occur as its sequel.

[1] *A Theoretical Basis of Human Behavior*, pp. 415–421, 2d rev. ed., 1929.

[2] *Ibid.*, p. 419.

[3] *Ibid.*, p. 421.

[4] W. S. Hunter, *General Psychology*, pp. 200–214, 1919.

[5] W. S. Hunter, Psychology and Anthroponomy, in *Psychologies of 1925* (ed. by Murchison), 1926.

[6] W. S. Hunter, The psychological study of behavior, *Psychol. Rev.*, 39, 1932, pp. 1–24.

In animal, as in human life, the successful attainment of the end towards which conation sets is highly pleasurable.[1]

Thorndike remarks about the state of fear as occasioned by a number of situations in his experiments with chicks three to four weeks old. In some cases he states that the feeling had "better be called discomfort than fear."[2] While the language may in many instances be uncritical and picturesque, we read that fish 'enjoy' the shade and that monkeys have feelings.

The literature on animal psychology in general then admits that the simple feeling of pleasantness and unpleasantness, perhaps in its vaguest phase, is present in the lower animals, some think in the lowest animal forms. Those who would stay strictly on the behavioristic level redefine their position in terms of response. It is gratifying to see, nevertheless, that there is a possibility of consciousness on this lowest level, where no sensory data can yet be forthcoming because the lowest animal has no sensory apparatus as such. Those who are willing to grant that there can be an undifferentiated sensitivity of protoplasmic tissue as we have posited an undifferentiated affective tone are really 'riding in the same boat' with us. Both affection and sensation are there as the trunk and leaves of a tree are in the seed. Only one difference should be noted: the permanent characteristic of the affective process, in terms of its vagueness and dependence in the fully developed mind, earmarks its claim to priority in the scale. Affection now is more like that early feeling than present sensations are like that early consciousness.

From this point on we can take for granted that if we follow the introspective description of mind, or if we follow also the behavioristic interpretation and translate the equivalent terminology, we shall find that sense-feelings are admittedly present in the lower animals which have a sufficient sensory apparatus. Hunger, thirst, sexual impulses, and the like are usually implied wherever differentiations of an anatomical and physiological order have progressed to that stage. Affective processes also become attached to other sensory experiences besides the organic and muscular groups when these become available. There will then be unpleasant tastes and odors, pleasant sights and sounds, or unpleasant touches, as the case may be. We can then speak of a certain amount of conditioning taking place in connection with reflex motor responses.

This leaves us to await still further development in the affective life. The question arises, how far in the direction of the growing life of

[1] C. L. Morgan, *Animal Behavior*, 2d ed., p. 247, 1908.

[2] E. L Thorndike, *Animal Intelligence*, pp. 162–168, 1911.

feeling can we expect to go among the lower animals as a whole and in what animal forms do these higher emotional experiences occur? When we discuss the emotions among the lower animals we find that not all writers distinguish between emotional responses *per se* and instinctive acts which may or may not be accompanied by feeling. Some authorities are inclined to believe that all instinctive performances are accompanied by some sort of feeling. In fact some psychologists argue in favor of a feeling component for every moment of the mental life– as a kind of running subjective commentary along with all forms of mental process. Since from introspective accounts we learn that the human being is often devoid of feeling, that on many occasions there is affective indifference, we see no reason why the lower animals should not have the same types of experiences. On one point we may make a safe assumption: not all instinctive acts are accompanied by *emotions*. Where the confusion has occurred is in the direction of designating both the instinctive act and the supposed emotional experience by the same name. We do better to refer to the integrated motor performance that is largely built up on an hereditary pattern and which corresponds to a total environmental situation as an *instinct*, while we designate as an *emotion* the experience which is correlated with such a response as its subjective equivalent.

3. Emotional Experiences of Animals.— There has been no end of reference to the emotions of the lower animals. On the other hand no careful study has been made of the variety of emotions which occur among the different animal forms. Neither do we know in what forms of animals emotions are first found. Numerous lower animals have been found to change their learning habits through unpleasant experiences. A perch was separated from minnows by a glass partition so that it bumped its nose against it many times until the partition was removed, after which it manifested no interest in the minnows and swam all around them without harming them. An earthworm has been trained to avoid dark places, toward which it naturally goes, by receiving electric shocks there. Cockroaches have been similarly 'taught' to change their habits. What has formerly then been a pleasant experience becomes an unpleasant one. In the case of the perch, the minnows simply became an unpleasant sight.[1] But in all these cases our simplest explanation would never require an emotional experience. A simple affective coloring of sensory stimuli would be sufficient.

A controversy has arisen, however, in the case of a dulling effect from a repeated stimulus. A ball of filter paper soaked in fish juice at first attracted

[1] M F. Washburn, *The Animal Mind*, pp 263–265.

the tentacles of a sea anemone. After repeated presentation the tentacles acted more weakly and finally utterly rejected it. This phenomenon has been explained on the basis of sensory adaptation, especially in view of the fact that other tentacles will react after one or more can no longer be stimulated. No such central factor as hunger could therefore be operative. Many authorities thus consider the reaction as illustrative of sensory fatigue. But where a general fighting attitude is assumed by animals as high in the scale as the ant or the spider and the provocation is then repeated until no sign of anger or fighting remains, Washburn assumes that we may plausibly refer to an emotional adaptation or dulling.[1] Anger or fighting is, therefore, probably one of the first emotional patterns to appear, if we relegate other responses that are connected with the bodily responses of food getting, reproduction, and the like to rubrics under the sense-feelings. The dividing point between the sense-feelings and the emotions may not be easily drawn, but the general principle of division is the factor of bodily references in the first case and the factor of objective, outward reference in the second case.

Many writers who have been in close contact with animals and are at the same time scientifically trained in psychology have not hesitated to ascribe emotional experiences of a varied nature to the lower animals. While for lack of space we can not mention all such authorities, some of the outstanding contributors will thus assist us in forming a true picture of the place of the feelings and emotions in the lower animals. In a recent summary of work done on the rat, Munn draws up an interesting portrait of fear. The difficulty in drawing up a clear-cut argument in favor of rats' fearing cats seems to hinge on the possibility that in those cases where no fear appeared in this situation there might be a question of incomplete neural maturation. When this factor is taken into account and mature rats are brought into olfactory proximity with cats, most studies indicate a dominant fear response.[2] Rats placed in water for the first time also have exhibited a fear response by unusually rapid swimming movements. Electrical stimuli also evoked fear responses in these forms. Anger may also be aroused by pinching the rat's tail and by stimulating its nose with a straw.[3]

In a readable book on the subject, Gates affords us a picture of the mentality of the modern cat. A chapter on the emotions attempts to answer the question: "Do cats experience emotions as men do?"[4] After a number of experimental results which showed by means of X-ray analysis that under emotional excitation digestive movements became inhibited and by means

[1] *Ibid.*, p. 255

[2] N. L. Munn, *An Introduction to Animal Psychology: The Behavior of the Rat*, pp. 12–14, 1933

[3] *Ibid*, p. 263.

[4] G. S. Gates, *The Modern Cat: Her Mind and Manners*, p. 156, 1928.

of blood tests that adrenalin had been secreted, we are reminded of Cannon's 'emergency theory' by way of explaining bodily reactions. The cat's behavior reveals in other situations that it is capable of showing rage, fright, and love. But the author warns us that even if we admit consciousness in the cat, as she apparently does, we should not be misled into the belief "that the animal feels anger, fear, or affection the way men do."[1] In the concluding chapter we are given a true picture of a mind that does not reach backward in terms of memory images or forward in terms of expectation. Its sensory equipment is limited, since the cat's world is colorless and toneless, ideas are absent. The emotions which it has, though they go by the same names as ours, must nevertheless be different in terms of such a mental background.

Considerable interest has been centered in animals which have been studied under controlled conditions and which, like the chimpanzee, gorillas, baboons, orangutan, gibbons, and other anthropoid apes, are fairly close to man in the evolutionary series. Yerkes, Köhler, and the Kelloggs have made extended and careful studies of these animals for long periods of time. In general Yerkes says that "the infrahuman primates have likes and dislikes, preferences and prejudices, which affect foods as well as other aspects of environment."[2] He devotes two chapters to the 'tender' emotions of affection, sympathy, and related social experiences and to the 'tough' emotions of fear, rage, resentment, and hatred. In fact he goes so far as to state "that in its emotional life this creature (the chimpanzee) very closely resembles man."[3] Says Köhler:

"Chimpanzees understand 'between themselves,' not only the expression of *subjective moods* and emotional states, but also of definite desires and urges, whether directed towards another of the same species, or towards other creatures or objects. I have described the manner in which some of them used the 'language of the eyes' when in a state of sexual excitement. A considerable proportion of all desires is naturally shown by direct imitation of the actions which are desired."[4]

He found at least indications of differences between the different species of apes: "Orangs, for example, have either a meagre emotional life, or are constitutionally unable to give it such vivid bodily expression."[5] He points out, too, that much more careful study is required in the case of these animals.

[1] *Ibid.*, p. 166.
[2] R. M. Yerkes, *Almost Human*, p. 212, 1925.
[3] *Ibid.*, p. 163.
[4] W. Köhler, *The Mentality of Apes* (trans. by Winter), p. 319, 1925.
[5] *Ibid.*, p. 318.

The Kelloggs describe the feelings and emotions of Gua, a female chimpanzee who was brought into the home at seven and one-half months of age and became the companion of a male child when it was ten months old. The companionship lasted for nine months. A large number of emotions were observed but perhaps the strangest emotion was the affection of the chimpanzee for the father of the child, who became the preferred observer.

"There was no apparent reason for the blind affection of the little animal, which would even cause her to attack her lesser friends in her loyalty to the greater ones. Thus, during Gua's sixteenth month, if the preferred observer made threatening movements towards the non-preferred, Gua would assist by barking and bristling to the attack of the latter even to the extent of using her teeth. If the non-preferred, on the other hand, should threaten or slap the preferred it was again the non-preferred whom Gua attacked, this time apparently in defense of her chief. Surely no patriot, even though governed by the precept 'My country, right or wrong' was ever moved by a more zealous devotion than that which Gua displayed towards the person of her choice. But it should be added in fairness to the ape that she would also threaten relative strangers who raised a hand against the non-preferred observer or against other members of the household."[1]

It was clear that the chimpanzee sought social contacts, although she avoided too close contact with strange animals. If these animals retreated at her approach, however, she would invariably chase after them. If the animals were aggressive, the chimpanzee definitely avoided them. In a chapter on the emotional behavior, the authors are on their guard lest conscious aspects of the behavior should be implied. They meant simply to record the observable behavior. Panting which later became a guttural laugh or chuckle first appeared at eight months of age. It was aroused by tickling sensitive areas, by spinning around or whirling, and by social playing. Köhler also reports something like a laugh, but never any weeping. Grief or sorrow was expressed by wailing or screaming. Fear proved to be the most important and most frequent of the unpleasant emotions. It was accompanied by screaming and by flight from the fear-inducing object. Tantrums were also more allied to fear than to anger. Fear was elicited through loss of support, loss of company, and the sudden approach of strange objects. Curiously, too, terror was aroused by any form of toadstool. The cue appeared to be a visual one and not one that was common as an incentive to fear in all chimpanzees. Other forms of emotional responses were anxiety and cautiousness. Anger

[1] *Op. cit.*, pp. 161–162.

seemed to be derived from an initial negativism or stubbornness and was also related in behavior patterns to irritation or impatience.

The Kelloggs give several instances which show to what a high degree the interpretation of the situation may influence the naming of the emotional response. This was particularly true of some of the observed responses of fear and jealousy. Some of these were undeniably interpreted as such, however, as was also the emotion of disappointment. Bashfulness appeared in the boy at fifteen months of age but not in the chimpanzee.

Much the same sort of story is told by Yerkes, who also includes excellent facial expressions of quietude, sadness, laughter, weeping, anger, excitement, affection, resentment (Fig. 53). These expressions become more and more like those of man as we pass from the monkeys to the great apes. Both jealousy and affection are illustrated in many carefully told stories and parental emotion is said to be more impressive in the primates than in any other animal form.[1] Jealousy is also violently expressed in biting and other forms of aggression when the chimpanzee has been neglected or overlooked in favor of another cellmate. Dissatisfaction, anxiety, or fear may be expressed by dropping to the ground, beating the floor with the hands, and screaming loudly. Among the most common aggressive or defensive emotions fear and terror is again noted. Anger is often expressed by self-injury, dashing the head against objects, throwing things to the ground, screaming violently, and other performances. But interesting stories are told of the quick change from aggressiveness to meekness and even to repentance when the other individual, who may be the keeper, shows himself to be the master. When all this has been recorded, however, Yerkes assures us that playful and affectionate expressions are far more frequent than the aggressive and destructive ones. In making comparisons with human beings, he significantly remarks, "The animals differ most of all from us in being perfectly natural, and in acting out, with little if any disguise, their feelings and ideas. We humans, by contrast, suppress, inhibit, disguise, and conceal

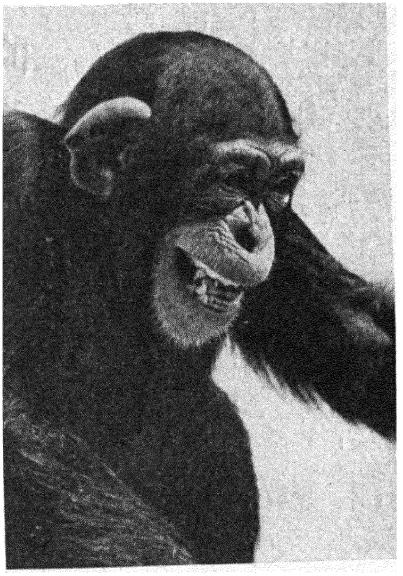


FIG. 53.—Chimpanzee expressing *anger:* showing wrinkling of upper part of face, narrowing of outward corner of eyes, lifting nose, drawing lips aside, showing teeth and gums. (*Courtesy of Mrs. N. N. Kohts.*)

[1] *Op. cit.*, p. 127.

emotions and thoughts."[1] And yet those who are familiar with the great apes give them great credit for enduring tremendous physical pain and anguish in utter silence.[2] Profuse are his descriptions of the different emotional responses in apes. Yerkes admits that much more needs to be done in that direction and intimates that what we thus may learn from the chimpanzees and related apes "will help us better to understand ourselves."[3]

Köhler, in his discussion of terror and awe allied to fear among the apes, makes the important point that not everything new and unknown strikes terror into these animals, because frequently new objects like geometrical figures made of wood were observed without the slightest indication of terror. He assumes that certain inherent principles in the objects perceived, certain shapes, outlines, and other characteristics make the object repellent. Tendencies residing for long generations in the mind as inherited dispositions contribute to the result. Not, therefore, snakes as snakes, but their noiseless, stealthy, sinuous movement and their shiny, glistening appearance produce fear and revulsion. We even have had connotations for such words as 'insinuating' and 'crooked.' Probably, then, not any one of these characteristics, but the total integration of them is operative. Each characteristic may have, however, its analogue in the organic, kinaesthetic, and tactual group of sensations which form the background of the revulsion. Of course, he admits that large and uncommon animals like the huge oxen of Teneriffe, the island on which the Biological Research Station was located, also caused a tremendous panic among the apes. Also very small animals, like a mother hen, can start a retreat among the apes, provided she assumes an aggressive and belligerent attitude. On the other hand, there was no sign of fear when barking dogs leapt at the bars of the cages. A cat, however, brought about an attitude of caution and reserve, until it spat at them and arched its back, when they hastily withdrew. Köhler also notes many instances of jealousy among apes, as well as of affection or dislike for one another. They protect each other in case of attack on any one of their number. Death or distress invariably produces expressions of excitement or mourning in the other animals provided they directly visually or auditorily perceive the distressed animal. When Köhler allowed two chimpanzees to come into their sleeping den out of a torrential rain, they "embraced him in a frenzy of joy." Another chimpanzee "flung her arms around my neck" after she had been punished for snatching food from a weaker animal.[4]

[1] *Ibid.*, p. 160.
[2] W. Köhler, *op. cit.*, note, p. 295.
[3] *Ibid.*, p. 164.
[4] *Ibid.*, pp. 293–342.

We see from these accounts that the chimpanzees and their close relatives display a variety of emotions and, according to those who have virtually lived with them, show every indication of experiencing these emotions. Naturally the usual care must be exercised not to overread their responses. All the writers quoted, for example, stress the notion that emotions grounded on ideational processes probably do not occur. But enough has been said to indicate that as we come closer to the human species, more and more do the emotions in number and in kind resemble our emotions. The human being, in so far as he has the possession of 'free' ideas and abstract concepts, can rise above the level here illustrated and pass on to such 'tenderer' and more generalized sentiments as are found in the aesthetic, ethical, and logical groups.

4. Summary.—Tempted as we are to discuss this interesting subject farther, we must gather up the principal items in our present collection and begin to travel into another field of exploration. We have noted some of the precautionary measures that we had to take in this particular area, which to some extent resembled in difficulty of attack the field of feelings and emotions among children. Economy of explanation was our protection against the tendency to interpret the animals in terms of our own minds. The simplest animal forms can be interpreted, from one point of view, as having the vaguest type of pleasantness and unpleasantness. Among the behaviorists of the differently modified forms we found, however, that the consciousness of the feeling could be left out of consideration in favor of the response mechanisms involved. Later on in the scale of development sense-feelings emerged on the basis of maturation. Maturation also seemed to account for the fact that certain inherited patterns may not be completed at birth so that inherent fears of certain animals toward definite objects and other animals have sometimes been in dispute.

Among the higher animals we rose definitely to the level of typical emotions but all the more do we here stand guard against assigning to them the full texture of human emotions. The chimpanzees give us a variegated picture of the emotions which may be called more primitive but also of those which approach the 'subtler' emotions of James and the 'tender' feelings of Seashore. Here the kind of situation which calls out the emotions and the emotions themselves become more complex. Many of the expressions closely resemble those of the human child and adult. In fact we have much to learn by way of contrast between the behavior of the animals just below man and the behavior of the human being under the same or similar circumstances. Some of the pertinent problems of mental hygiene look perhaps for their solution to the reactions of the apes in the face of their rather complex environ-

ment. For one thing the chimpanzee's complete register of emotional expression is so much more extensive and vivid that there is a greater outlet of pent-up energy in both the pleasant and the unpleasant groups of experiences. As we have seen in our discussion of pathological and of Freudian theories, inhibitions of legitimately expressed emotions can raise havoc in our mental and bodily life. We are not pleading for a situation which would 'take the lid off' indiscriminately, but we are suggesting that proper channels for the fruitful and wholesome release of emotional energy may be found in the educational, ethical, and cultural enterprises in our civilization as it should be today. At the same time the taboo against emotional expression seems to be gradually lifting in favor of a greater frankness and openness in human relationship. When emotional expression is inhibited because of consideration for other individuals, no one will deny its value; but when it is withheld because one is afraid or ashamed to reveal the mental processes that lie behind, then either the attitude and practice of repression or the mental processes that lie behind need mending.

Review Questions

1. Give instances from your own experience of the uncritical use of the anecdotal method.
2. Why can we not attribute to the lowest animal forms the type of pleasantness and unpleasantness which we feel?
3. Outline the behavioristic interpretation of feeling and emotion.
4. Apply the phylogenetic theory of feeling and emotion to the appearance of various stages of the affective life among the animals.
5. Discuss fear among the chimpanzees.
6. To what extent is the emotion of rage in the cat different from the human emotion of rage?
7. Interpret the phrase, 'emotional adaptation.' To what extent is it found in human beings?
8. Give instances of jealousy among domesticated animals.
9. In what way may we mentally interpret the fact that pleasant objects may become unpleasant?
10. List all the emotions which have been reported among the apes.

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CHAPTER XVIII

FEELINGS AND EMOTIONS IN THE EDUCATIONAL PROGRAM

We think that a vast increase of human joy can be brought about by uniting education and recreation And if we get more joy we shall get more of other things that are sadly wanted, more music, more clean conduct: more good fellowship, more community spirit· more beautiful cities; and more value in our social life.

L P. Jacks, *Education through Recreation*

1. Changing Attitudes toward the School.—The writer knows a group of young boys who constructed out of clay and cement what was to them a model town. There was a beautiful stream, a bridge over it, a dam, a swimming hole, a garage or two, a number of houses, roads with automobiles, and a host of other interesting objects. But two types of objects had been consciously or unconsciously omitted: there was no church and there was no school. Whole books might be written with that as a text, but let us here regard the incident merely as a warning signal. We have discussed the theories which have stressed avoidance and pursuit; and we have just now described the emotional responses of·children and the lower animals. What other deduction is possible than the one which draws from the psychology of children the conclusion that their minds, especially in the lower ranges, are highly emotionally colored because they have not yet arrived at the level of abstract thinking or of preoccupation with ideas? Combined with the theory of pursuit and avoidance, what other interpretation can we give than the inference that the school and the church were avoided because of unpleasant associations? In the case of the church, yes, there is another possibility—there may be no associations at all or possibly only a few associations. But these boys well knew the school—and they left it out.

'It can not be successfully denied that the policy of education has noticeably changed in the last several decades. From the previous notion of formal discipline and the heavy requirement of classical subjects we have moved well along in the direction of interest and motivation, of a variety of attractive subjects, and of new pedagogical devices like visual presentation through motion pictures, visits to local industrial and institutional establishments, and the like. (Rugg and Shumaker have clearly and picturesquely described this transformation, which they characterized as a revolution.) The maximal

development of personality and of individual expression, instead of training for social usefulness in accordance with traditional matrices of thought, have been the underlying goals of the more recent movements in education. "Tolerant understanding and creative self-expression—the two great aims of the new education."[1] Like all reform movements, we might ask, has this tendency to extol the virtues and abilities of the individual swung too far in the opposite direction? In order to make the change, to gain the public ear, to combat the older well-grooved force, is this movement not emphasizing the individual and the self too much, so that out of the child-centered schools are emerging individuals who are making a self-centered society? It is a well-known dynamic principle that in any kind of reciprocating action, such as pendular motion, an abnormally strong system of energy is necessary to bring the mass of the swinging body gradually to rest from its previously oppositely directed motion and to start it again with a violent motion in the contrary direction. After all, educational policies do not swing just to and fro, but gradually onward. It is as if to the pendulum a writing point or pencil were attached which leaves a sinusoidal or pendular wave written on the record of time. What are or should be some of the lateral forces that operate while the pendulum is swinging back and forth to make the record one of achievement and progress as the swings occur?

We are not primarily concerned with all of such tangential forces: we are mainly interested in those phases of the problem which involve the subject of this book, the feelings and emotions, and here only those affective phenomena which can be brought to bear on the educational situation or program. Like many scientific truths, the facts may not lie all in one direction or at one extreme. We are not, of course, pleading for half-truths, but we are drawing attention to the fact that after we have caused the pendulum to swing away from the school-centered child toward the child-centered school, we still are charged with the responsibility of creating forces which shall moderate these two opposing tendencies or rather integrate them in the line of progress. Obviously either extreme is not only socially undesirable but also psychologically fallacious. Discipline for the sake of discipline, doing something hard because it is hard, does not gain many adherents or converts today. Spartan training may be necessary for emergencies, but it will not do in an age when science is boasting about the comforts which it has brought to our social life. Psychologically, too, there is still argument rife concerning the identical elements that are supposed to be transferable in formal discipline. At the other extreme of the pendulum it is equally hard to justify the policy of softening the process of education so that it does not require

[1] H. Rugg and A. Shumaker, *The Child-centered School: An Appraisal of the New Education*, 1928.

mastication or of sugar-coating what can not otherwise be camouflaged because the essence of it is really bitter. A number of writers are continually warning us that we have carried too far the policy of making education interesting and amusing.

In a recent summary of criticisms voiced against the school systems of the country, a curious division of opinion occurred. This review was based upon a study of forty-four articles written between 1928 and 1933 by laymen for magazines enjoying a national circulation, twenty articles prepared by educators for the same list of periodicals, twelve recent professional books chosen from a list already highly selected, and a list of criticisms of secondary education which was prepared by eighty-eight specialists. Almost 28 per cent of the vote in the total of the sixty-four articles fell into that category in the list of a dozen criticisms which was labeled, "'Soft pedagogy'; too many frills." To this result the laymen contributed a heavier vote than did the educators. The professional books gave "lack of contact with life" and "neglect of civic and social efficiency" the heaviest vote, while the eighty eight specialists also stressed the last criticism and "severe discipline; overwork of students." From outside the professional ranks of the educators, a persistent protest seems to arise against the obvious tendency to pamper the child and not to adapt education to a high goal or standard of achievement that has a durable continuity through the ages, but to suit it to the likes, dislikes, whims, and caprices of the individual child. Asking students to vote on their teachers, encouraging comments on how a given course could be improved, if not taken with the proverbial grain of salt, inevitably leads in the direction of pampering the pupil.[1]

Unfortunately the tendency to soften the rigors of education is threading its way to the portals of the highest institutions of learning in the country, the universities themselves. Because the standards of teaching the various subjects in the secondary schools have dropped so low and because such a miscellaneous bargain lot of subjects are being offered for sale in many of the high schools, the statisticians can find no reliable coefficients of correlation between the subjects pursued in the high schools and success in college. Therefore out go the entrance requirements. These statistics obviously play into the hands of an increasing majority who claim that state institutions of learning must throw their doors wide open to all who wish to enter. The children of the state must get what they cry for. Little do these clamorous individuals, who sometimes are cloaked with the raiments of administrative office, realize that their institutions of learning will inevitably become prostitutions of learning and the halo surrounding

[1] Evaluating the Public Schools (Joint Report), *The Phi Delta Kappan*, 16, 1934, p. 174.

the baccalaureate degree by this process will soon become like sounding brass or a tinkling cymbal. The same deterioration of subject matter which is increasingly cropping out of the secondary schools is bound to contaminate the colleges, and the softening process will at least be consistently carried forward because it will then be complete. Dr. A. L. Jones, the late Director of Admissions of Columbia University, voices a vehement protest against this march of time in his recent report to the president of that great university:

"The first years in college would presuppose no specific information. On this plan there may be little or nothing in the first two years of the college course which a student could not get in a first-rate high school and at the end of the college course he may have progressed no further—if as far—in intellectual achievement than a graduate of a European secondary school."[1]

There are some seriously minded educators who are willing to sponsor such a movement as conforming to their highest ideals of education; there are others who wish to have the system tried as an educational experiment with the pupils of several generations utilized as laboratory animals; there are others who see the movement as the advance of a great educational glacier against which protests can be of no avail. What is the answer?

We would not take so long to expound an educational problem if it did not concern us from the standpoint of the feelings and emotions. The answer from the present writer's point of view is twofold. First, we must strive to get much more cooperation of an emotional sort in the classroom and, secondly, we must try to educate the whole man, the emotions and the will as well as the intellect. Both of these points are vital to the question from the point of view of this book. We have come now to a pass when some of the essential results of the previous chapters can be brought to bear by way of application. While we have admitted in many places a paucity of facts, especially quantitative data, we have cleared away enough underbrush to see the terrain more clearly and to make out the contour of the bare ground. In the face of many who are not so familiar with the area of feeling and emotion and who nevertheless appear to speak with authority concerning the educational system of our country, perhaps the presentation of a few thoughts on the part of one who has occupied himself for some time with affective problems may not be amiss.

2. The Ideal Emotional Attitude in the Classroom.—The problem of the child-centered school *vs.* the school-centered child can be answered, as is usual with problems, by a compromise. The older attitude of learn-

[1] *N. Y. Times*, Sunday, Jan. 21, 1934.

ing for learning's sake, or of going to school because that is the right thing to do, will probably never return. It apparently involved a spirit of puritanical self-control which was fitted to the environment of the day. On the other hand, the diametrically opposite drift of passive entertainment, almost flagrantly suggesting a 'show me' attitude on the part of the student, or even more vulgarly the 'do your stuff' bearing —this can find absolutely no support in the psychology of learning. When teachers and professors are selected for the same purpose as are so-called bathing beauties, namely for show, then education has come to its wit's end, granting the assumption of a wit to begin with. That possibility is literally at the end of the road on which we are now traveling. Not only is education being made as pleasant as possible in the taking thereof, but when you have it in terms of grades, or of so many years or of semester hours of schooling, it often becomes as external an event as the diploma that is hung on the wall. The writer has seen even some of his friends attempt to wash their hands of it. Sometimes it was easily shaken off, sometimes it required a little washing or a special solvent like alcohol, sometimes you had to wait until it just rubbed off with time. We might go on to discuss still other questions like the aims, if any, which students have in going to college. The 'if any' is purposely inserted because, when so many go to college and the gates are each year held still farther ajar with publicity agents for colleges traveling all over the country selling college educations at or below cost, there are no longer any aims—you just go.

The fundamental concept, however, is that of emotional cooperation. The writer has frequently remarked to his students that one thing we can all learn from the field of college athletics: in the ideal athletic situation, the teams *work with* the coach. If we can instill the counterpart of this attitude in the classroom, the battle is better than half won. The student and teacher should work together; neither teacher nor student should be expected to do *all* the work. In that way, under complex machinery of education today, we can still psychologically maintain the ideal college which was described by Mark Hopkins about a century ago, as a teacher sitting at one end of the log and the student on the other. Several of the points so ably brought out by President Glenn Frank, of the University of Wisconsin, in as concise a statement as the writer has ever seen, are sighted in this direction:

"The great teacher establishes a personal as well as professional relation with his students. . . . The great teacher has a gracious spirit and a tonic gayety of mind because, first, he conceives teaching as an exhilarating enterprise, and second, because he approaches his task with a sense of confidence."

The other seven points are also worth noting.[1] The daily lecture, recitation, or discussion should be so well managed that the student and teacher accomplish much and work hard in a common enterprise in learning and understanding. Enthusiasm should run high, the hour will be filled with occasional pleasant banter but also with vigorous intellectual blows in which even the teacher sometimes 'gets hit.' If the teacher wins at every point the spirit of good fun will be taken out of the combat: that is like father 'playing' checkers or chess with his little son. If father always wins, the zest is soon taken out of the son's playing. The writer never feels that his classroom discussion or his informal addresses are at all successful unless there are some wholesome attacks from the class or audience afterwards. He always encourages his students "to get up on their hind legs and fight back." Not only does the hour thus pass quickly, but in retrospect most students report that much ground was covered provided that the discussion was well managed so as to center about some given point or thread of discourse.

After all, there is sound psychology behind such a procedure. As is well known in the experiments on learning, much material passes passively in review every day that does not 'register' in memory—at least not in a conscious or accessible way. If we take into account the numerous impressions from conversation, newspaper, magazine, motion picture, and the like, which daily come and go, we realize that not all such items can leave anything like permanent traces in the nervous system. Some items are objectively impressed in terms of vividness, suddenness, novelty, and other characteristics of the stimulus and its surroundings. But suppose we hear a good joke or an anecdote and we say, "My, that was a good one; I shall try to remember that," the chances are very much in favor of our remembering the story, especially if we make the point of telling it once at the first opportunity. This half emotional, half attentional factor has been found to be important in many experiments on learning.[2] A special, almost untranslatable term has been coined to emphasize this factor. It is called the *Aufgabe*, or task, and it may be a self-assigned instruction, often latently or unconsciously carried, or it may be given by some one else as an instruction. If we are commissioned to get something for someone else, to run an errand in the course of the day's events, we usually make a mental note of it and then when the opportune time

[1] G. Frank, Some marks of a great teacher, *The Phi Delta Kappan*, 17, 1934, p. 5.

[2] W. B. Pillsbury, *Education as the Psychologist Sees It*, pp. 160 f., 1925; E. Meumann, *The Psychology of Learning* (trans. by Baird), pp. 287 f., 1913; S. S. Colvin, *The Learning Process*, p. 45, 1913.

appears we are bothered by this latent charge until it is discharged, that is, if all goes well. That same type of experience occurs in the learning problems and is an illustration of the force of the *Aufgabe.* On the teacher's part, through his own personal traits, through his intensely vigorous and vivid manner of presentation, through his contagious enthusiasms, certain items in the course of the hour should become so attractive that at least those of his students who are not inherently vegetables should naturally sit up, take notice, and say silently, "There's something that I want to make my own."

This process is far removed from mere entertainment or even the general awakening of interest. It demands that the student share the hour actively and dynamically with the teacher. He does not sit back to enjoy himself and then discover that the hour has passed so quickly and agreeably. Hours can pass quickly, painlessly, and therefore agreeably to them when students doze in the rear seats. The test question to the student is, "Has the hour passed quickly and agreeably even though *I have worked hard?*" In addition there is also the usual feature that the student has not worked hard for a *grade,* but in a common enterprise with and for the teacher as athletes "work their heads off," even to the point of injury, to *please the coach.* How much such an electrified atmosphere contrasts with what is found in many schoolrooms perhaps the following instance will illustrate. An eminent psychiatrist was commenting on the fact that in his numerous visits to such classrooms in a large city he so frequently encountered a terrific strain between the 'school-ma'am' and the 'pupil.' "The teacher is tense, suspicious, ready for anything; the children are subdued, belligerent, explosive." It is a surprising thing and a fact that does great credit to the inherent resistance of the students, that they are still explosive and not utterly abashed! But the present writer vigorously supports what the commentator who quotes the situation says in his own italics:

"It seems to me that *nothing a child can learn intellectually in such a schoolroom can ever compensate him for the mental, moral, and probably physical disintegration that goes on under such immoral conditions.*"[1]

Hart rightly rings a stinging rebuke against the great emphasis on intelligence levels and the disregard of inherent and real interest—not the teacher's interest alone nor the student's interest alone, but their combined and coordinated interest—and says that the colleges have not felt the full impact yet of this unnatural situation. Instruction under such conditions replaces understanding and teaching becomes merely training if it succeeds even at that. A disregard of the natural feelings in such a practice leads to trouble. "No human nervous system," says Hart, "can stand up long under the dishonesties of such arbitrary situations."[2]

[1] J. K. Hart, Personality problems of teachers, *Prog. Educ.*, 8, 1931, pp. 219–222.
[2] *Ibid.*, p. 221.

Haggerty, one of our leading authorities in the area of the psychology of learning, disappointingly remarks in regard to the measurement of teaching success that "even the legerdemain of statistical analysis seems not to promise a great deal." He considers the essential element in the process of teaching the teacher-pupil relationship and points out quite sharply that the matter of analyzing success in this relationship is hardly a question of individual psychology but of social psychology. Different subjects in the curriculum, different types of student materials, different environments, all require different teaching abilities. Mothers teach their babies, little children teach other children, corporals teach recruits, foremen teach workers, policemen teach motorists, statesmen teach their constituencies, professors teach students, and morons on the playground and elsewhere seek out those whom they can lead and influence.[1] We thus see that not only must the teacher adapt himself to the student, and the student incidentally also to the teacher, but there is a certain larger adaptation and adjustment to various fields. The chief element which the teacher should recognize is that the relation between student and teacher is in essence a social relationship. A real teacher is as sensitive to the different types of students and to the class as a whole as a musician is sensitive to an audience. In neither situation does success follow in the wake of a "take it or leave it" attitude on the part of the artist. For truly teaching in its highest conception is an art and an art has an emotional or affective setting.

Nothing is more easily subject to misconstruction than the foregoing statement. It should, however, be uttered in the strongest possible terms in order to combat the customary assumption that teaching is simply an intellectual exercise. Where there is no verve, no enthusiasm or fire, there is very little or no teaching. Cheap sentimentality is out of order, of course, and no opportunity for keen intellectual play is also unpardonable—but the *play* is the thing, provided both sides play and play hard. The notion that the situation should be *merely* intellectual was a very natural outgrowth of an outworn psychology which stressed man's intellectual endowment mainly because he most radically differed from the lower animals on that point. When psychology began to realize that man was what the animals were plus some additional higher mental processes, then the outlook began gradually to change. His emotional reactions were studied, but that type of investigation was begun so late, as we have seen, that its full fruits even now have not yet been harvested. Much of the fruit of the many industrious researches is not ripe enough to be harvested. Some of the fruit, too, as in

[1] M. E. Haggerty, The crux of the teaching prognosis problem, *Sch. and Soc.*, 35, 1932, pp. 545–549.

the case with some men, is perhaps mellow before it is ripe! Be that as it may, the educational process is slow to appreciate the real problem of learning. We must educate the whole man, not only his intellect.

3. The Education of the Whole Man.—Many far-sighted educators are beginning to realize what is perhaps one of the major problems of education: the pupil or student has too long been regarded as a thinking machine. Mind was considered largely as intellect. Whatever else entered his mental make-up, or his personality, was not made the direct object of educational development. Recently we have begun to make a more concerted drive toward character education and personality ratings, but these movements are still immature in their growth and their 'hunger cries' are just beginning to be recognized. Part of the difficulty lies also in the overemphasis which we have placed on the program of intelligence testing, to say nothing for the moment about the whole matter of 'grade-point' averages. Drives, incentives to motivation, aims, and ideals, all have had a recognized place in the school and college program, but, outside a few institutions that direct their efforts toward the education for 'ethical culture' and the like, these emotional processes have been used as a means to an end and not as ends in themselves. The culture of the intellect was the end.

As we have noted in the introductory chapters, such an outlook toward human nature is woefully incomplete. If this book had as its major concern the modern equivalent of the will, the dynamic aspects of mind as expressed in the consciousness of action, we could still say that our accounts were lamentably lacking, even with the feelings and emotions included as part and parcel of human nature. Much could be written about the education for proper action and performance within the various levels of achievement. It is necessary to balance all the various aspects of mind in an educational program so that a well-poised personality can be envisaged as the probable product of the process. Just now, however, we are stressing the cultivation of feelings and emotions as the most immediate need of our educational practice and preliminary to that is the recognition of the emotional side of the individual pupil and student. While there are some general principles which may emerge from a study like this to guide the beginning teacher along his path of achievement, it is also safe to say that the emotional treatment of students may turn out to be an individual problem with some common bases of reference. The art of teaching, like the art of medicine, requires the skill of a family physician who often knows his patient, if the physician is fortunate, from the cradle almost to the grave. Athletic coaches often confess to individual treatment: one football player needs to be made angry almost through insult, at least through vigorous scolding, another who is more sensitive and would melt away into inefficiency may need to be cajoled and encouraged to get the best results. Such is often the case with students.

But what is far more important is that the curriculum of our schools should presently give a place of honor to courses which develop the feelings in the mental life of the students. Much is being done now by way of a beginning in encouraging musical, literary, and artistic talent and in holding contests of skill in this direction. The courses on artistic appreciation should however hold a prominent place in the curriculum so that the many who can not produce or compose could learn the essentials of emotional appreciation. Unfortunately the multiplication of the sciences, the high and perhaps undue recognition given to them, the readiness with which applications of utility can be made out for them, all these have tended to crowd out the type of education which the Platonic philosophy advocated in the search for beauty and good as well as for truth. For now we know that any single object can be true, beautiful, and good. Automobiles, houses, chairs, books can be useful and efficient, but also attractive. So it is with the human mind.

4. The Program of Affective Education.—A famous psychologist has stressed the fact that education should be specifically focused on the feelings as well as on the intellect. He shows that in addition to intelligence there is the capacity for mechanical skill, the degree of persistent effort, and the development in emotional balance or tone. "The unbalanced will and the unbalanced emotional disposition contribute with the lack of intelligence to give us the criminal and the pathological cases which we call the insane and the neurotic."[1] Educators are saying that the development of these unbalanced individuals is a direct charge against the schools. The notion that training in the arts is reserved for the especially well talented or at least for those who are chiefly interested on their own initiative has long governed the teaching of such subjects. There has even been current the tacit assumption that men who were interested in developing an artistic appreciation were not really men: women had the finer senses of artistic proportion, balance, and composition. In other words, practical men of affairs did not require in their training the softening influence of the arts or of belles-lettres and kindred subjects. Only genius on the one side and the effeminate males on the other were regarded as susceptible to artistic cultivation—and, of course, the 'gentler' sex itself. The yardstick was often the possible practical utility of the venture, hardly ever the cultural aspect of the exposure to art was considered. Many real artists who have contributed to our wealth of aesthetic enjoyment have also pointed out that even another insidious superstition barred

[1] W. B. Pillsbury, *Education as the Psychologist Sees It*, p. 40, 1925.

the way not only to artistic appreciation but also to artistic production. If you could not draw, you could not become an artist. Some of these artists, by their own acknowledgment, would not have risen to their high level of achievement, if such a rule or its accompanying inhibition would have been put into force in their early days.

All this is becoming gradually better today. The university authorities and the secondary schools themselves are beginning to sponsor classes designed for the general appreciation of music and the other fine arts and open to nonmusicians and nonartists as well as to those especially endowed with ability in these directions. Furthermore there is a growing conviction that a musician should be at least acquainted with, and preferably be given real insight into, the literary, dramatic, and graphic arts as well. All the arts are relatives 'under the skin,' as it were, and have many principles in common. On the hypothesis, too, that an artistic temperament may lead to an unbalanced mental hygiene, there is a growing tendency to acquaint students not only with the neighboring arts beyond the frontiers of their own art, but with the scientific, objective, and critical approaches furnished by the sciences. For not only may we overemphasize the intellectual factors and make individuals prosaic, uninteresting thinking mechanisms, but we may make of a relatively smaller group of persons, who have shown artistic skill and sensitivity, temperamentally unbalanced and emotionally upset psychaesthenics. In all matters then dangerous extremes lie on either side of the middle road. A balanced ration is the safe course in mental as well as in bodily assimilation, with special doses here and there to suit individual differences in capacity or need.

The radio programs, when they are well supervised by wise managers, as they often are not, have done much to spread the gospel of a better and wider culture that is as masculine as it is feminine. Art knows no sex; but unart knows the mental hunchback and monstrosity. Growing also is the interest in contests of skill in the presentation of artistic products by musicians, painters, sculptors, and literary lights in the making. Secondary schools are becoming increasingly proud of their artistic output in national and state-wide events of this character. But much needs to be done to formulate systematically an educational policy which shall find expression in well-balanced curricula that shall raise the level and spread the effect of genuine culture on all sides and through the entire texture of our population. Remarkable it is from what lowly sources, economically and socially speaking, some of the precious gems of artistic culture arise. We should do all that we can to study this problem intensively and to the full, so that some of the grotesquely built personalities that grate on our civilized ears shall

gradually diminish in number. Even a vivid sense of humor goes far to reveal the stunted and malformed minds that are sometimes called educated and civilized.

5. **Summary.**—If this chapter appears to be largely hortatory in tone, if it has much of the manner of a prospectus, the reader should realize that it is because the area covered still has few buildings upon it. As we look around the subdivision, all that we can see is a mental 'real-estate' office, somewhat barren streets laid out with rather fantastic names at the intersections. At any rate in all hopefulness we can say that it is more than a sketchy map. We have noted that outstanding authorities have sensed the lack of a proper perspective in the education of the entire personality of the individual. In the attempt to get rid of the compulsory and unpleasant features of a rigorous education, where corporal punishment and formal discipline ruled over body and mind, the pendulum has tended to swerve over to the opposite extreme of softening the teaching program in order to entice the interests of the learning. Not only the lower grades but the highest seats of learning in the country have felt the impulse to meet the student situation. It was not considered possible to compromise with the student and to encourage him to meet the instructor halfway.

The learning process from the psychological angle, however, involves just such a cooperative atmosphere in which the student, though physically less active than the teacher, is still mentally alert, aggressive, and dynamic in his attitude. If we are to believe some of the essential data that research on learning has discovered, there must be an eager search and a zest for acquisition in the pupil's mind. A well-known preacher, who is now a bishop of the church, had a large college congregation near the campus of a famous university. The president of the university was a member of the congregation. Some of us asked the minister how it felt to preach almost every Sunday to the president of the university who, as it also happened, was a distinguished scholar in his chosen field. "Gentlemen," he said, "I used to worry about that a good deal. One day I mustered up enough courage to ask the president how he felt listening to my sermons week after week. The president replied, 'Well, you see, Doctor B——, there isn't a sermon of yours so bad, but what I can get something out of it.'" The writer has often told students this story when they have come complaining about college courses and lectures, conceivably also his own, though that type of information usually does not come so directly. In other words students should be encouraged to 'bite into' a course or a book with an irresistible attack and a vigorous drive. This drive is emotionally colored and fired, and the fire must often come from the eye and will

of the teacher who is a leader and an enthusiastic example of the very attitude which he wishes to arouse in his students.

The next point had to do with the attitude of the teacher in meeting the student and in enticing him to come at least halfway. The teaching process, we saw, is not merely the imparting and implanting of information. It is a social as well as an intellectual situation. A president of a large midwestern university recently said that students do not study their courses as much as they study their professors. That can have, of course, also a bad odor, implying what used to be called in the college vernacular 'leg-pulling' and now, perhaps, 'apple-polishing.' But it is good psychology to suppose on the more pleasant side that the student tries to decide whether his professor periodically beats up his wife or whether he prefers to play golf. At any rate much more is transferred under those conditions than the mere mental pabulum which the professor intentionally serves out to the student. We have here also a really emotional situation that should be taken into account as ever an ideal to be reached rather than to be disregarded.

And finally we pleaded for a more intensive and extensive program, carefully and systematically studied out, to bring about a stepwise education of the emotional nature of boys and girls from the lowest grades to the highest levels of graduate work in the university—not for the few but for the many. In preparation for a doctorate degree a certain professor warned the student that he was deficient in general culture and advised him to read in the general literature as well as in his scientific specialty. Surely enough, during the examination, which covered many minute points in his thesis and in his particular scientific field, the professor asked the student what he knew concerning Victor Hugo and his principal literary works. More of that spirit of an all-round culture, including an ever widening acquaintance with the world's best works of an artistic nature, from the simple affective responses to color, to form, to combinations of color and form, to proportions, to balance, harmony, and the rest—from these simpler sensory appeals all the way to the real appreciation of the symbolism of a symphony or of a piece of sculpture or of a sonnet—all this real education of the latent demands of a full personality is the ideal toward which we should now be moving.

Review Questions

1. Outline the various bearings of motivation in the school situation as affecting both student and teacher.

2. What is the proper balance between pleasant and unpleasant feelings and emotions in the classroom?

3. To what extent may passive arousal of interest by way of entertainment go too far in that direction?

4. What are the dangers of making education less rigorous?

5. Outline the *social* relationship of teacher to pupil.

6. What is meant by the *Aufgabe* or task in the learning process?

7. Should all individuals receive the same type of motivation? Illustrate from your own experience.

8. What elements, aside from the intellectual factor, in the complete personality of the student need cultivation?

9. Make concrete suggestions toward a tentative list of artistic projects that shall follow in sequence through the grades, high school, and college, for the average, not the talented, student.

10. What is your general reaction to the main proposal of this chapter?

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CHAPTER XIX

CULTURE AND THE AFFECTIVE LIFE

By common consent, the Parthenon is a great work of art. Yet it has esthetic standing only as the work becomes an experience for a human being.

John Dewey, *Art as Experience*.

1. The Higher Ranges of the Affective Life.—A student recently asked the writer what is the importance of studying the pleasant and unpleasant reactions to color by the procedure of impression. "What good does it do?" he asked in all earnestness. While pure science, as we have discussed it in our introductory chapters, need not answer the question of utility, it does no harm to be brought to earth occasionally by such an inquiry. One answer lies in the above quotation from Dewey's monumental work on aesthetic experience. All the beauties that are revealed in nature or that are made by man are not beautiful in any absolute sense, but they become so when appreciated through the experience of man. They are not beautiful even in terms of any kind of conscious experience: they are presumably not beautiful to a monkey, or to a cocker spaniel, or to a white mouse. The symmetrical web of a spider is not beautiful to the spider, and even if a luna moth could see itself in the reflection of a placid lake, it could not appreciate its own beauty. And yet conscious as we are of thrills derived from aesthetic appreciation, we could no more have arrived at the level of artistic enjoyment, unless we had originally been pleased with sensory appeals, than we could conceive of the magnitude of the stellar universe without the possibility of sensations and images. Pleasant and unpleasant reactions to simple sensory impressions, though they may go no farther—as indeed they do not in the lowest animal forms—ultimately may lead to the highest embraces of aesthetic, ethical, and logical appeals of an affective order.

In the higher levels of the affective processes not much experimental work is available. Some of the typical investigations have already been referred to in previous connections. But there are great possibilities before us in the scientific analysis of such experiences as the enjoyment of a musical selection and in the production of artistic singing. Several studies of this kind are under way or are being projected in the Psychological Laboratory at the University of Iowa. A few have been published. But most, if not all, of

these studies necessarily take an analytical point of view, so that the perception of a tonal sequence in the determination of proper melodic endings or the reaction to a definite tonal fusion in a consonance are scrutinized from the point of view of the affective response involved in each separate instance. The writer has been recording scores of electrodermal responses to significant sections of phonographic music. Weld has published some introspective descriptions, together with respiratory and circulatory curves recorded while listening to music of various types.

But it is not very likely, unless our techniques become much more refined, that we can obtain bodily responses which are related to the higher sentiments and the aesthetic experiences. We saw that when the response is emotional in the sense in which we have defined it, a bodily reaction can be detected and recorded, but when the cognitive aspect of the feeling moves into the higher phases of the ideational processes, the bodily component becomes observably much less vigorous and intense and less complex. In the numerous photographic records which the writer has taken in connection with the electrodermal response, only a few gave evidence of a definite deflection, even when introspectively the observer reported real affective thrills. In the cases where a deflection occurred, the report indicated an emotional experience rather than an aesthetic appeal. Besides, there is every indication that persons respond under those conditions in a much wider variety of ways. Responses may involve tears welling up in the eyes and constrictions in the throat region while hardly affecting the electrodermal response. A strong indication points to the differences in bodily types in individual cases. We should presently begin to investigate structural and functional differences between, let us say, the Kretschmer distinctions of pyknic, asthenic, and athletic builds, or some classification of this order. So far our results, even with keen aesthetic enjoyment, especially in the case of music, have been largely negative. No thoroughgoing experimental investigations, so far as the writer knows, have been made with other forms of aesthetic enjoyment, *e.g.*, in the graphic and plastic arts, the silent reading of poetry, *etc.*, but at present there is little or no likelihood that bodily responses can be depended upon as crucial indicators in the direction of giving us characteristic distinctions of the aesthetic, ethical, and logical feelings.

More promise is shown by investigations which analyze the action of the voluntary mechanisms, let us say, with respect to singing and speaking. Even here, it is not likely that variations registering merely aesthetic appeals will show much of a physical criterion to be operative. We have before noticed the extreme unlikelihood of any critical distinction's being made between emotions that pass by different names, on the basis of their intrinsic

bodily patterns of response. The same statement probably holds true, at least for the present, concerning the aesthetic sentiments. Nevertheless it will always be pertinent to attempt an analysis of the different ways in which definite effects are produced aiming at a variety of aesthetic expression. The aesthetic sentiments are, however, so complex that, first of all, they involve a large, probably on the affective side the largest, integration of all mental and bodily processes and, secondly, they have a strong component of ideational material. Bodily responses are at a minimum, and the host of memorial, imaginative, and intellectual factors are at a maximum. We are not avoiding an analysis of such a complex experience as the aesthetic appreciation of a symphony which comes with the preparation, the gradual working up of the minor musical episodes, the first announcement of the principal themes, the elaboration of them, until the final measures are reached. The first movement of the much played D minor symphony of César Franck is a good example. But we doubt whether the analysis of these effects can be reduced to simple terms without realizing that the total integrated response depends on a long series of related events in the lifetime of the individual listener and performer.

With the idea that some of the bodily responses are organic sensations and some are kinaesthetic or muscular in nature, a thoroughgoing analytic attack should require (1) a multiple arrangement of recording devices over many areas of the body and (2) a minute mental differentiation of all types of sensations, images, abstract ideas, together with their affective setting. Such an undertaking would be pre-eminently worth while but, to the writer's knowledge, has not yet been done. We should also want to command the services of observers who are introspectively trained to assume the scientific attitude and at the same time are highly appreciative of a wide variety of musical writing. The same story should be repeated in other branches of art before a chapter of this sort can be written on the basis of experimental data. As it stands, we can write it only from the systematic and general angle.

2. The Aesthetic Sentiments Related to the Entire Self.—When we thus come to the apex of our system of feeling, we realize more than ever that the cognitive element in the feeling is still present but it is related to abstract values and quite closely to the entire self. It seems a strange paradox that at the bottom of the ladder of the affective life we started with simple incognitive feelings of pleasantness and unpleasantness which presently became orientated to the welfare of the organism and thus took on a subjective aspect. Now at the very end of our story we are again back to the individual, but in the meantime we have gone a long journey and are more specifically orientated toward the mental side of the individual. When the end of developmental

series of the affective life is reached, we find that the entire personality of the individual is the cognitive factor which is projected upon the feeling experience. The Sistine Madonna of Raphael, the Thinker of Rodin, the Seventh Symphony of Beethoven, the Faust of Goethe, the Platonic Parable of the Cave, all arouse in the individual who is exposed to them a feeling of satisfaction in the exaltation of the whole personality. Puffer calls this "the principle of unity in harmonious functioning," which has its roots in the Lipps' processes of empathy—of feeling into the situation or object as it is being presented.[1]

" . . . The flow of ideas and impulses is a circle rounding upon itself, all associations, emotions, expectations indissolubly linked with the central thought and leading back only to it, and proceeding in an irrevocable order, which is yet adapted to the possibilities of human experience."

This she calls the psychological equilibrium. Together with the "coexistence of opposing impulses which heightens the sense of being while it prevents action" and the "quietude of the will, in the acceptance of the given moral attitude for the whole scheme of life" this produces "a fusion of these three orders of the mental life, the perfect moment of unity and self-completeness." While we might not accept this type of synthesis for all forms of art, we should probably agree that Dewey's statement comes near the actual mark: "A work of art no matter how old and classic is actually, not just potentially, a work of art only when it lives in some individualized experience."[2] The fate of some works of art that represented in their various forms a phase of experience which the composer felt but which was not common to the people of his day is often commented on in the history of music, literature, sculpture, and painting. For example, Wagner had to wait until the close of his life to obtain real appreciation for the works which he considered best. With what a pathetic heart-rending spirit he bowed to the will of his French audiences and inserted ballet music or its equivalent in Tannhäuser. The lyric strains of his "Evening Star" aria, which was easily acclaimed by the populace, gave him only pangs of disappointment that he had ever condescended to write so inane a theme. It often takes repeated contact with the artistic production, or better still, an enriched cultural background to become enthusiastic over something which does not at all appeal to us at first. If people are inclined to fall asleep at a symphonic concert, it is likely that they do

[1] E. Puffer, *The Psychology of Beauty*, pp. 285–286, 1905.
[2] J. Dewey, *Art as Experience*, p. 108, 1934.

so because they have not enough associated ideas and feelings to keep them awake. The music is relatively devoid of suggested experiences.[1]

Some experimental evidence seems to corroborate the fact that continued exposure to aesthetic materials, that were not appreciated before, produced pleasant effects when they were finally better understood in terms of training. Mere repetition often brought this about. Moore has shown us that in ancient times, the octave, the perfect fifth, and the perfect fourth were considered as the most pleasant intervals, while the thirds and sixths were declared to be unpleasant and the seconds and sevenths were thought to be extremely discordant. Today we believe the first group to be pleasing but inane and uninteresting and we generally forbid them in harmonic progressions even in the 'hidden' form, unless, indeed, they are intentionally used for definite effects. The second group is now both pleasant and interesting, while the last group is dissonant but quite interesting when properly treated in relation to resolutions and thematic modulation.[2] Valentine confirmed these results on a large number of children and adults,[3] and Farnsworth has demonstrated the fact that repetition affording increasing familiarity with an odd ending effect leads to an increasing preference for that type of ending in a melody.[4]

Other investigations have likewise given us grounds for the inference that enjoyment of aesthetic objects and situations is based upon associations which the presentation arouses in us and to which we respond as we read them into the objective conditions. These associations do have to come from formal education. The wealth of life's experiences often furnishes the background for much of the enjoyment. But in the final analysis, the fullest appreciation of literature comes only from great absorption of literary writings of the best sort; music can only be thoroughly enjoyed when it is buttressed by wide assimilation of the best forms of musical composition; painting and sculpture are far more keenly understood when many art galleries have been visited, the history of the graphic arts comprehended, and numerous examples of art interpreted. It is well worth remembering, too, that all art is interrelated and that a student of music should be well acquainted with the drama and with the world's best poetry, to say nothing of being well versed in the products and techniques of the

[1] In fact H. A. Bruce in his book, *Sleep and Sleeplessness*, 1915, makes the startling assertion based on numerous instances that the more active the mind is, the less sleep it requires, provided that the *quality* of sleep is thereby improved!

[2] H. T. Moore, The genetic aspect of consonance and dissonance, *Psychol. Monog.*, 17, 1914, No. 2, 17.

[3] *Op. cit.*, *Brit. J. Psychol.*

[4] P. R. Farnsworth, The effect of repetition on ending preferences in melodies, *Amer. J. Psychol.*, 37, 1926, pp. 116–122.

graphic arts. Nor should it stop there, since the individual needs to be rounded out in a scientific way, so that he at least appreciates the objective, impersonal approach to truth from the angle of a disinterested intellectual attitude.

In this connection a reservation might be made to take into account the excellent products often born of new movements and of artists who 'crash' the traditions. We need only mention names like Wagner, Debussy, and Schoenberg in music, Rodin and Gaudier-Brzeska[1] in sculpture, Thomas Benton and Grant Wood in painting, Amy Lowell and Gertrude Stein in literature to suggest still other names referring to individuals in each of these fields who have broken away from the orthodox manner and have aimed to produce new mediums of expression. They are not in the category of persons who have something to say but no adequate means of expressing what they think and feel. They are rather individuals who have a message and have invented new mediums of expression that may have to wait for assimilation by their contemporaries—often, too, only by their successors—to be really understood and appreciated. But the point is that until such an event occurs and their art is experienced through the newer channels, it does not fulfill its true function as art. When such a time comes then both the style and the content may be experienced as aesthetic feelings. It is also a verifiable fact that almost all such pioneers have mastered the traditional styles and techniques before they devised new ones. The newer ideas were a subtle outgrowth of a well-seasoned period of apprenticeship in the classical forms.

3. Bodily Components in the Higher Feelings.—While we have stressed the waning part played by bodily reactions in the enjoyment of the higher feelings like the aesthetic, moral, and logical sentiments, it is also true that these bodily components probably have not disappeared. There seems to be a large individual difference in the matter of responding to the situation through bodily channels. What we must not forget, however, is that the personality or the self, which so intensely identifies itself with the artistic, ethical, and logical situation to be appreciated, is often represented by organic, visceral, and motor components. The self is partly felt as a bodily self. Pressures, throbs, thrills, motor strains and stresses, and warm glows are all bodily responses. In pathological cases we often find that schizophrenia and dissociations of personality are accompanied by general organic anaesthesias in a variety of patterns. In other words, when amnesia occurs and the person loses all trace of name, place of residence, and past

[1] H. S. Ede in his *The Savage Messiah*, 1931, gives an excellent account and justification of the life of Gaudier-Brzeska.

experience, he may be internally insensitive—or at least relatively so. He would probably be not at all interested in artistic appreciations which require the merging of the self with the artistic production or even with a beautiful sunset and other natural phenomena of beauty. On the other hand, if a person has taken part, for example, in an orchestra performance of a symphony and is rich in such associations with a particular symphony, he feels many bodily responses within him as he listens to such a production at a concert or over the radio. He is full of reflex reactions which correspond in abbreviated form to his former playing experiences or, in the case of a choral concert, to his former singing performance. Besides, there are numerous organic processes that make his body as well as his mind react very richly.

In terms of this type of response, we may say that his whole self responds and that his enjoyment is inordinately more complete. It has 'body,' so to speak. Such a statement may be a strong argument in favor of actually participating in the various artistic productions as much as one can, not only to get the intimate experiences involved in composing and producing art, but to get by way of appreciation a much more *vital* enjoyment. Many of the writer's friends have joined with the writer himself in declaring that often they find themselves physically tired after listening to a concert which they enjoyed. The arms and shoulders of a violinist will feel quite tired and the throat and trunk of a vocalist will be fatigued merely from listening, but the fatigue is of the pleasant order that follows the taking of a long 'hike' into the open country![1]

So we may say that we can not afford to neglect the bodily components as an entire responsive mechanism, even if our refined techniques, applied to separate systems of bodily response, give us no clear-cut picture of what is taking place. There can be no doubt about the solidity of the self's being represented in a vaguely conscious background of organic and kinaesthetic sensory groups while we are aesthetically moved in the contemplation of the beautiful. A 'bodyless' empathy and enjoyment is inconceivable even in those who have never participated in the actual production of a drama or a symphony. If the self is identified at all with the enjoyment of an artistic situation it is not a cold type of identification of the personality that takes place; it is not a bare reference to past experience by way of memory; it is not the mere recognition of formal beauty in the abstract. It is rather an intimate mind-body response which resonates with the environmental presentation. Perhaps not until we have harnessed

[1] C. A. Ruckmick, Why an Investment in Music Lessons Always Pays, *Etude*, 47, 1929, pp. 21–22.

all the forces which produce these physiological responses, perhaps not until we have made our techniques much more sensitive as physical and chemical instruments, shall we obtain direct evidence of these processes. Already there are numerous indicators that these responses occur *en masse*.

4. **Summary.**—While in this chapter we have not been able to assemble as many experimental data as were brought together in some of the other chapters in support of the statements made, we have attempted to describe the life of feeling as it emerges on the highest levels of development in man. While techniques which give us the physiological components of the different types of aesthetic enjoyment either are at present disappointing as to results or are not yet adequately developed in their experimental attack, we found that they need not be considered as negligible. The difficulty of making analytical approaches in an area which is primarily a complete entity or pattern was also pointed out. Perhaps a series of studies which would show objectively what the desiderata of artistic performance in singing and playing or in the dramatic reading of lines are would come more closely to the central task. Nevertheless the necessity of experiencing art as related to the individual self, emphasized by many authorities, comes to the foreground in terms of general bodily sensations which represent one of the fundamental bases of the self or personality.

Such an interpretation suggests again the importance not only of training students to appreciate the beautiful and the good and the true but also of encouraging them to produce examples of these abstract qualities. They will thus add to the world's treasure which still others can enjoy, but they will bring out in themselves a fuller enjoyment of that which they in turn are privileged to understand and appreciate. Rich aesthetic feeling therefore includes affective reactions to the whole gamut of cognitive processes, from the simplest sounds, as sounds, to the abstract values of contrapuntal development in music. They who thus achieve, if they are fortunate, are doubly repaid: they receive gratitude from their fellow human beings either during their own lifetime or later in future generations for the beautiful, good, and true works which they have created and they are enabled in terms of their own mastery to appreciate to a fuller extent the aesthetic, ethical, and logical values which are more and more obvious to those who are thus initiated.

Review Questions

1. Defend the statement that psychologically art is experience.
2. Distinguish the sentiments and the emotions.

3. May simple affective responses to color and tone be related to aesthetic enjoyment? Explain.

4. What are the possibilities of bolily response in aesthetic enjoyment?

5. To what extent do ethical and logical situations reveal aesthetic appreciation?

6. Take a concrete example to illustrate the identification of the self with the artistic product.

7. If art is not appreciated by contemporaneous individuals, is it still art?

8. Can ethical conduct be construed as aesthetic?

9. What part does past performance play in aesthetic appreciation?

10. Make as complete and detailed a plea as possible for artistic training and education.

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CHAPTER XX

IN SUMMARY AND CONCLUSION

You will find in the selection of contributions to this Symposium, as will also be the case for those in the future, a strong emphasis placed upon the genetic approach. It seems to me that we now witness an altogether too artificial division line between the investigations of momentary consciousness and behavior in laboratory adult psychology on the one hand, and a study of the growing mental-bodily structure of the child on the other. . . . May it be possible then that a systematic work of comparison and correlation of these two so intimately interrelated aspects may receive its impetus from this Symposium?

M. L. Reymert, *Feelings and Emotions: the Wittenberg Symposium.*

1. The Genetic Aspect of Feeling and Emotion.—We are now at the point where we need to gather in, from the various chapters, the central thread of discourse which led up to, formulated, and applied at various points our phylogenetic theory of feeling and emotion. We saw that the most comprehensive way to treat the subject, as Reymert suggested in his opening address at the Wittenberg Symposium of internationally illustrious psychologists in October of 1927, was through the genetic approach. Once consciousness is admitted in the lowest form of animal organism, as many psychologists have inferred, then the question arises, what form did that consciousness take and what steps took place in its development? In answer to that question we tried not only to build up a plausible theory with its neural substrate but at repeated intervals to marshal data in support of such a theory.

And so we constructed a sort of tripod on which the phylogenetic theory has to stand. One leg of this tripod represented the assumption that all mental processes have some kind of a physiological correlate. We do not here have to go into the long drawn-out historical struggle as to what type of mind-body relationship is the most plausible. That there is some sort of relationship between mind and body has proved to be a tenable hypothesis for most of the different psychologies of whatever stripe they may be. This kind of an assumption needed little defense in an area of investigation, that of the feelings and emotions, which, as we have seen, has drawn so many of its facts and theories from the subsoil of the body, especially through the expressive techniques. It is hardly now a controvertible issue that the feelings,

probably more than any other mental process, leave widespread bodily effects in their train. To seek some special correlate in the neural structures of the body is, therefore, only an extension of the fundamental premise implied in the mind-body relationship. It is, indeed, neither a new nor a hazardous venture.

The second leg of our tripod consisted of the primary inference that the simple feeling or affective process represents the first phase of dawning consciousness in the evolutionary series of animals. In other words, before sensory processes of any type were developed, even prior to the common sensation of the earlier psychologists, a vague noncognitive type of consciousness could be presumed. This again was not a new presumption but has been defended by Horwicz, Lewes, Spencer, Ribot, and to some extent, among others, by Höffding. The affective process or that of simple feeling is, therefore, to be considered as an extremely rudimentary form of awareness, pointing, as we have seen, not to outside objects and conditions but to the welfare of the body.

The third leg of our tripod comprised a restatement at the mental level of the Coghill theory of progressive organization from the whole to the part. In numerous ways Coghill has advanced the notion of increasing internal specificity of structure and function, not impelled in response to outward stimulation, as is required in the doctrines of reflexology, but driven by forces residing in the organism on a genetic pattern. Reflexology requires building up of complex wholes out of simple reflexes. The Coghill principle, based on both a space and a time factor, begins with very general and widespread structures and functions and ends with specialized and limited parts and operations. The neural basis for the feelings extends this theory to the mental life, not as an exclusive interpretation but as a complementary aspect to that of reflexology and one which needs particular emphasis today. Thus, by the process of progressive integration, the affective life was not only the earliest form of consciousness but that most widespread and all-pervading type out of which by progressive stages all the different forms of feeling and, indeed, the entire pattern of other processes like sensation, perception, memory, and thought, grew.

2. A Restatement of the Phylogenetic Theory.—It might be well to restate at this point the phylogenetic theory of feeling and emotion:

1. The affective life begins with consciousness itself in the lowest forms of animal life. The simple or elementary feelings, or the affective processes, are to be identified with this early form of experience. In other words, consciousness is nothing more than feeling in the technical sense of the word.

2. As the mental life develops, this elementary phase of consciousness spreads from whole to part in the sense that it becomes attached to, that it

permeates through, every succeeding phase of developing conscious process. On the neural side, therefore, no special receptor or effector mechanism is required, since none was needed in the first place when the animal was nothing more than a single cell. It uses progressively, however, all channels which have gradually come into existence for the conveyance of electrochemical energy, especially those systems like the plexuses, the autonomic, and the central nervous systems, which most speedily transmit energy from the whole organism to the part.

A genetic theory of this type best overcomes some of the difficulties that have presented themselves in the systematic treatment of the affective life. They may be briefly reviewed under the following specific rubrics:

1. Many writers on the subject have called attention to the inherent vagueness and indefiniteness of the affective processes. This peculiarity has been stressed in numerous ways, depending upon the systematic frame in which the affective processes were treated. They are supposed to lack objectivity of reference and to display an essential subjectivity. It is difficult, if not impossible, to itemize them out of a complex consciousness in the same manner as sensations, perceptions, ideas, and the like are analyzed. They have been denied the attensive attribute in the sense that they can never be attentively scrutinized. But this situation is as it should be when we are dealing with a peculiarly noncognitive phase of consciousness which marks the first stage of development out of a totally nonconscious and merely physiological stratum. In this condition it would be more plausible to assume that, if any reference occurs at all, it should be in the direction of bodily welfare or the general disposition of the organism as a whole rather than merely to definite outside objects.

2. The next difficulty has been the question of a restricted number of qualities. Outside Wundt and Royce, most psychologists have agreed to limit the qualities to two. As has already been pointed out elsewhere, there is another curious situation in that the name of one of these qualities is simply the negative of the other. We have pleasantness and unpleasantness, agreeableness and disagreeableness, likes and dislikes, pleasure and unpleasure. In short, nowhere else have we limited the qualitative descriptions of a whole class of experiences to as few as two and nowhere else have we had to take the additional step of saying that one quality is merely the negative of the other. But this again pointed in the direction of a very elementary process which we have no reason to compare with the more differentiated processes that came later. Even the earlier confusion of unpleasantness with pain is systematically significant in that the sensation of pain refers primarily to the state of the organism and not to an outside object.

3. The added difficulty of deciding whether or not the affective element exists in its own right from a systematic point of view also fitted into our genetic picture. Vacillation of its status from attribute to element and back again to attribute, to say nothing of all the attempts which have been made

to identify the affective process with some form of sensation, pointed further in the direction of an advancing integration from whole to part and the close connection which such an extremely rudimentary process must have to the sensations which succeeded it as a part of that differentiation.

4. The present tendency of the affective processes to tie themselves up primarily with the organic and kinaesthetic groups of sensation would also point to their low stage in the developmental series. But when sensations arrived on the scene at all, the vague feelings were probably tied up with those muscular and visceral differentiations which took place in the organism before special structures of other sensory sorts appeared. Only later were affective processes attached to the olfactory, auditory, and visual modalities, the last two of which then became the bases of the highest aesthetic experiences.

3. The Neural Correlates of Feeling and Emotion.—We turn now to the neural substratum for this all-pervasive affective process. We must look for that type of neural structure which, in all likelihood, is the oldest type still to be found in our bodies. It should be a type of structure out of which all other types may have emerged on the path from whole to part. Most writers agree that this type of nervous structure is to be found in the nerve network or plexus. Here we have a truly autonomic structure or, at least, as nearly autonomic as we may hope to find anywhere in the whole animal kingdom. We still find it in many parts of our own bodies, especially in those vital organs that require continued periodic movements like the heart, lungs, oesophagus, stomach, and intestines. The continued periodicity of peristaltic movements and the persistent activity of the circulatory and respiratory systems are tied up directly with the plexuses, which are embedded in the walls of the corresponding structures. These networks strongly suggest the type of differentiated cytoplasm which Kofoid has found through ultramicroscopic techniques in many of the simple planktons. They are here responsible for the periodic movements of cilia and flagella.

These networks are not restricted to the structures just mentioned but are embedded also in the walls of blood vessels, capillaries, and the skeletal musculature. While it is dangerous to carry the conjecture too far, there is considerable experimental evidence coming in now to indicate that when a definite integument was added, the next type of sensation which came into the picture after the organic and kinaesthetic group was pain. Bishop believes that pain is carried over the nonmyelinated fibers of the dorsal roots as a function of the *B* fibers, which are faster conducting than the *C* fibers with also a somewhat shorter action potential.[1] Waterston identifies pain

[1] G. H. Bishop, P. Heinbecker, and J. L. O'Leary, The function of the non-myelinated fibers of the dorsal roots, *Amer. J. Physiol.*, 106, 1933, pp. 647–669.

principally with the corium or dermis but also with the walls of blood vessels and capillaries. He agrees with the usual allocation of pain to the free nerve endings.[1] Since, however, the allocation of the cutaneous qualities is in a state of confusion (as indeed are the allocations to the cortex itself) our argument is not so strong as it might be. On the other hand, I believe no one has ever found a differentiated sensory organ for pain. On the strength of this, we could say that, structurally considered, pain is quite a rudimentary sensation and one of the offshoots of the all-pervasive feeling. This again is further supported by the fact that practically all the sensations, of whatever modality they may be when abnormally stimulated, include pain. The neural mechanism then follows in its development the growth of the affective life and of the accompanying mental processes.

At the bottom of the ladder, then, we have the simplest feelings, connected with nerve networks and with still more rudimentary, differentiated tissue in the single-celled animals.

After the appearance of the widely distributed system of plexuses the next ramified system to emerge by way of more restricted function of the whole was the so-called autonomic system with its balanced branches of the sympathetic and parasympathetic divisions. At first in its simpler stages of development, this was sufficient as a vehicle for the sense-feelings. When the emotions arose, however, a central nervous system was called for in addition to the autonomic system in order to provide a pathway for perceptual materials as an outlet and also to provide for a greater degree of integration of response. All existing experimental work calls for a channel through the higher levels of cerebral activity. Cannon included arcs from the thalamus to the cortex and back. Troland suggested a retroflex arc, which is essentially the same thing except that it goes to the frontal areas of the cerebrum. When this development first arrived, a control by way of totally inhibited, of delayed, or of modified response patterns based upon previous experience was early provided for. Soon, however, previous experience was given its more adequate representative, the idea, and other intellectual processes, which then, in themselves, became the foci of further affective coloring. The highest levels of the brain now became the part which functioned affectively at times and gave rise to such mental processes as the true sentiments. These highly abstract affective processes, differentiated out of the lower mental processes, when in the human animal ideas first became possible, give us the last stages of definite development in the affective life. Now artistic appreciation and production could be attained, now

[1] D. Waterston, On pain, *Lancet*, 1, 1933, pp. 934–946.

ethical codes of conduct could be evaluated, and now fine intellectual achievements could be appraised.

We should not overlook the fact that the affective toning or coloring still preserves its original prerogative of sweeping over the entire organism on both its mental and its physical aspects. Thus it leads to a shaping of the whole personality or character and makes itself manifest both through transitory dispositions and more or less permanent temperaments. The self is still included in its domain as well as the various specific functions of the self. Here in the assigned affective attributes of character, psychology is as yet on somewhat unscientific ground, though the future should bring to light more technical research methods in attacking the higher ranges of the problem.

4. The Effect of the Cerebral Areas.—We also carefully surveyed the vast amount of physiological research that lies at our door concerning the gradual development of the higher brain centers and their relation to the affective life. The techniques of decortication and decerebration as we have noticed have amply indicated the progressive organization from whole to part. As the brain centers became specialized so the mental aspects of feeling become gradually more definite functions. For example, there are no definite coordinated responses, such as are implied in emotional behavior, in the central system below the medulla or myelencephalon. In the medulla, centers can be tapped which give reactions that are easily elicited and also somewhat intensive in character but not sufficiently coordinated to be called emotional. This is true also for the metencephalon, which includes the pons and the cerebellum. Here there is some increase in the number of individual reactions which may become emotional responses but they are not yet sufficiently coordinated for making generalized and intensive reactions. Here also are located some centers for facial expression of emotion together with modified vocal utterance. In the mesencephalon or midbrain region, centers for so-called pseudaffective reflexes such as emotional mewing, clawing, snapping of jaws, violent kicking, and growling are found. There is a greater range and complexity of behavior, integration of visceral and skeletal movement and intensity of response with a lower threshold of stimulation and altogether a closer approach to emotional behavior.

But not until we get to the diencephalon, which comprises the thalamus and the hypothalamus, do we have the 'sham' or infuriated rage of Cannon with vigorous lashing of the tail, arching of the trunk, thrusting and jerking of the legs under restraint, projection of jaws and clawing movements, snarling, biting, rapid panting respiration, erection of tail hairs, elevation of vibrissae, together with an increase of blood

sugar (5x) and enlargement of the pupil (3x). At this point Bekhterev found signs of pleasurable behavior. Finally in the telencephalon, which includes the cerebral cortex in the endbrain, we find the true cognitive emotions with unpredictable, modified responses to perceived or ideated objects and situations. The somatomimetic movements of Bekhterev are assigned to this center.

In fine, the picture here presented involves a continuously developing affective life on the mental side from the vaguest type of conscious feeling to the more specialized and complexly involved ranges of emotion and sentiment. The original characteristics of each stage of development are to some extent preserved intact in the most highly developed organism, the human being. We are still capable of experiencing the whole gamut of feeling from the vaguest incognitive feelings of comfort and discomfort to the most abstract sentiments which correspond to artistic, ethical, and logical appreciation. Each type of feeling also serves its specific function from the reference to bodily welfare all the way to the envisagement of external events and circumstances.

While we were stressing a phylogenetic approach which is to some extent repeated in an abbreviated and telescoped form in the individual we wished to emphasize the close relationship which we have everywhere assumed between the developing body and the growing mind. If this correlation and companionship can not be experimentally proved—as it very likely never will on account of the tremendously complicated pattern on which each aspect, the bodily and the mental, is built, all systematically and logically drawn inferences point to this relationship. Barring slight reservations in a few places, we are in accord with the excellent and succinct statement recently made by Sherrington in his Rede Lecture at the University of Cambridge:

"But indeed, what right have we to conjoin mental experience with physiological? No scientific right; only the right of what Keats, with that superlative Shakespearian gift of his, dubbed busy common sense. The right which practical life, naïve and shrewd, often exercises. To many of us a mere juxtaposition of the two sets of happenings proclaims their disparity. On the one side changing electrical potentials with thermal and chemical action making a physiological entity held together by energy relations: on the other, a suite of mental experience, an activity no doubt, but in what if any relation to energy? As for me, what little I know of the one, does not, speaking personally, even begin to help me toward the how of the other. The two, for all I can do, seem to remain disparate and disconnected. I recognize that, from observation which becomes more and more precise, the time and place of the two sets of events seem to be coincident. All goes to show that they do in so far correspond. Mental experience on the one hand, and brain happenings on the other, though I cannot correlate

together, I nevertheless find to coincide in time and space. We admit that the physico-chemical, to which we here seek to correlate the 'mental experience,' is for us itself at long last mental, a thought, an idea. But that does not help because, at least to me, neither of the two appears related to the other. As mental events I should suppose them aloof. Science, nobly, declines as proof anything but complete proof, but common sense, pressed for time, accepts and acts on acceptance."[1]

Some of the actual experimental attempts which we discussed disappointed us in their failure to find exact correlates at each step of genetic development. As we moved onward, however, from simple affection to the higher ranges of sentiment, we found that the increasing development of the mind itself provided richer materials which were cognitively incorporated in the affective life and we also found an added interplay of the bodily components, especially through the emergence of more specialized neural mechanisms. No introspective psychologist bent upon the exclusive use of direct observational methods could progress far without taking into account the procession of bodily processes and their responses and no behaviorist, persuaded to deny the experiential component of the psychophysiological organism, could adequately explain the distinction between 'cold,' 'quasi,' and 'real' emotions. Much less could either type of approach completely describe what is meant by emotion, since most of the workers in the field will admit that the pattern of behavior in itself gives little or no cue as to the type of emotion that is felt.

While the author has asked the reader to follow him through a veritable maze of detail, the pains of his labors may find little compensation or reward in the outcome. We have learned much about fear, rage, love, and the rest, but we do not yet know what they are. A similar statement may be made concerning many of the entities, like electricity, the reality of which the scientist today assumes, except for the difference that having been harder at work for a much longer period, he knows much more about such things. We have no excuse to offer for the youth of our science, but we are a little ashamed to acknowledge that the field of feeling and emotion has so long been neglected. Only by taking stock of what we have learned, and of what we do not know, is progress possible in this area.

[1] C. S. Sherrington, *The Brain and Its Mechanism*, pp. 23–24, 1933.

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