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PSYCHOLOGY AND PRACTICAL LIFE

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PREFACE

THIS book has a twofold purpose. On the one hand, its object is to place before the intelligent reading public a general account of the various directions in which modern psychology has been or may be applied. On the other hand, it is intended to provide an elementary textbook for students of Applied Psychology. It is hoped that the book will be found useful from both points of view.

M. C.
J. D.

EDINBURGH UNIVERSITY,
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CHAPTER I

INTRODUCTION

THE FIELD OF APPLIED PSYCHOLOGY

THE last half century has witnessed a great development in the science we call psychology. This is really a very old science, as far as its origins are concerned, since it originated in man's curiosity regarding his own inner life, and that must have been experienced at a very early stage of human development. But it is a new science if we date its beginnings from the adoption of experimental methods. In the older days psychology was regarded as a branch of philosophy more or less closely allied to metaphysics. The newer psychology, on the other hand, belongs with physiology, zoology, and the other biological sciences. It can excite no surprise that this breakaway from philosophy has been associated with a profound change in the point of view of the science. The essential character of this change can be made clear by comparing the way in which psychology was defined fifty years ago with the way it is defined to-day. According to the old view, which is still largely the view of the man in the street, psychology was defined as the science which studies the mind or mental processes. At the present time it is defined rather as the science which studies behaviour, and seeks to understand behaviour, in terms of the phenomena of the inner life of thought and feeling. This change of emphasis from the mind to behaviour is very significant. It means in effect that psychology has descended from the misty heights of philosophy to the world of everyday

life and common things, that the psychologist has deserted his study for the street and the market-place ; in fine, that the science is now a science of concrete facts and daily happenings. The behaviour of ourselves and our fellow-men is a field of study at least as important, and affecting the welfare of humanity at large at least as closely, as the field of study of physics or chemistry.

So long as psychology was looked upon as the science of the mind, it could hardly fail to be the battle-ground of rival systems of philosophy, and little else, while ' psychologist ' and ' metaphysician ' were regarded as synonymous terms. Nothing could have been more inimical both to its development as a science and to its reputation with the man of action. The philosopher, in spite of his professed enthusiasm in the cause of truth, has at all stages in the world's history been sufficiently human to emphasize those truths which chimed in with his own way of thinking, and to turn a blind eye upon, if he could not explain away, those facts which his theory of the universe did not seem capable of absorbing and assimilating. The result could scarcely be other than a maimed and mutilated science. But that was not all the evil. The association with metaphysics was quite fatal as far as the practical man was concerned.

When, however, the psychologist began to concern himself primarily with the understanding of the behaviour of the human being in his response to physical, industrial, and social conditions, the whole position was changed. His field of study was now concrete, and came within the everyday experience of the practical man. The behaviour of the human being was constantly presenting to the practical man the most baffling problems, and often also the problems were most baffling at the precise points

where it was of the greatest practical importance that the individual's response should be understood. If science in its progress could help the practical man to solve practical problems of human behaviour, he was very ready to avail himself of its assistance, and if the particular science that was in a position to offer assistance was psychology, he was not likely to let an old, and possibly unfounded, prejudice against that science form for long an obstacle in the way of obtaining the kind of help he needed. Hence the change of attitude towards psychology which has so quickly followed upon the changed viewpoint in the science itself.

One natural and inevitable result of this changed point of view in recent times has been the coming into existence of an applied science which has already made very remarkable progress. It is clear from what has just been said that applied psychology will have a very wide field —a field wider perhaps than the field of any other applied science. Wherever in practical life we are concerned with human behaviour, that is, wherever the human factor is involved in professional, industrial, or social life, there the facts and laws of the science will find application.

There are three main aspects of the science of psychology which may find practical application. These are: the standpoint or attitude, the knowledge or content, and the method or technique. A book on applied psychology might be arranged on this basis, instead of on the basis usually adopted. In some respects it would perhaps be a better and more logical arrangement. Though it is not our intention to adopt this arrangement in the present work, a general survey of the field from this point of view will be of service by way of introduction to the chapters which follow.

I. THE PSYCHOLOGICAL STANDPOINT

The standpoint of the science of psychology might be described as, on the whole, predominantly analytic. In this respect psychology perhaps resembles most closely chemistry among the physical sciences. A great part of the science is occupied with the analysis of the different aspects of mental life and of behaviour. More and more refined methods of analysis have been a characteristic feature of the progress of experimental psychology in recent times. The adoption of this attitude in relation to problems of practical life, and more particularly of industrial life, can be seen in several important developments of applied psychology. Perhaps the best illustration is what is called 'time and motion study.' This kind of work may be said to have started with the investigations of Taylor and Gilbreth in connexion with the 'scientific management' movement. It began with relatively simple analysis of the different movements involved in a piece of work and the timing of these movements by means of a stop-watch. Later, very elaborate methods and an elaborate technique were developed, which will be described in a later chapter.[1]

II. PSYCHOLOGICAL KNOWLEDGE OR CONTENT

The content aspect is the usual aspect of a theoretical science to pass over into applied science. In recent years there has been a great accumulation of psychological knowledge having direct and immediate practical bearing. Almost every branch of psychology has contributed, although the contributions of what has been called 'dynamic psychology' have attracted most attention.

[1] See Chapter VII.

Dynamic psychology' may be concisely described as the study of the human organism in action. One of its main sections is the study of the underlying motives of action. In this connexion the study of the phenomena of the unconscious and of the phenomena of suggestion must be regarded as having originated very valuable applications of psychology, particularly in the medical and educational fields. We are still far from a complete understanding either of the phenomena of the unconscious or of the phenomena of suggestion, but in both cases almost every item of knowledge we possess is significant for our practical dealing with human beings in almost all the relations of life. In the field of medicine the chief application of such knowledge is found in the methods of psychotherapy which have come into use in recent times.

While the contribution of dynamic psychology has been most impressive, the contributions of other branches of the science have not been by any means insignificant. In the educational field, for example, the study of learning and memory, as we shall see later, has been very fruitful in results of practical importance. The same is true as regards the analytical study by the psychologist of the various school subjects. Reading, for example, has been exhaustively studied. Three main lines of investigation have been followed: (1) the variation in speed of silent reading in different individuals and the conditions upon which such variation depends; (2) the various motor habits, particularly eye movements, involved in reading; and (3) the perception of words in reading, and the conditions upon which the recognition of words depends.

As regards individual variations in speed of reading, this has been found to depend on the kind of material

read, the length of the line, the habits of eye movement developed in learning to read, and the nature of the inner speech accompanying reading. The last is a very important factor. The more complete the inner speech, the more does silent reading approximate in speed to reading aloud. The child, when learning to read silently, at first accompanies his reading by whispering every word. The movement of his lips can be easily observed. This whispered speech with lip movement can also be easily observed in unpractised adult readers. With practice, however, lip movements tend gradually to disappear, and the inner speech takes on more and more of what may be called a 'skeleton' character. Most practised readers retain an inner accompaniment of the reading in the form of auditory images of the words seen. That is, they hear the words with the mind's ear, as it were, before the meaning of what is read comes to the mind. With rapid readers even this inner speech becomes very fragmentary, only the more important words being heard with the mind's ear, and some very rapid readers claim that they have no inner speech at all, the meaning being directly given by the words as seen. The entire disappearance of inner speech in this way is exceedingly rare, but it is certain that readers can increase their rate of reading very materially by reducing it to a minimum. The desirability of making such an effort will be realized when it is remembered that a very rapid reader reads about three times as fast as a slow reader, and apparently without any diminution in power of comprehension. The saving of time for those who do a great deal of reading is obvious.

The study of eye movements in reading has been no less fruitful. In reading a line of print the eyes do not move

continuously along the line. Anyone can convince himself of this by watching the eyes of a reader. The movement is by short jerks with pauses between. These movements have been recorded photographically by reflecting a beam of light from the cornea of the eye on to a moving film or plate. If this beam is interrupted regularly—say fifty times a second—we can record the duration of the movements and the pauses respectively. When this is done it becomes evident that the actual reading takes place during the pauses, since the movements are much too rapid for the eye, while moving, to see the print clearly. During the movements, in fact, the line of print ought to appear simply as a blur. We are not conscious of this because we have learned to suppress it. It is also found that the movements and fixation pauses are very regular with practised readers, the number of movements depending on the length of the line and the nature of the matter read, and varying with the rate of reading. Habits of eye movement are acquired early by the child, as his reading becomes easy and fluent, and some reading defects and difficulties are to be traced either to the lack of development of regular eye movements, or to the unnecessary multiplication of fixation pauses.

As regards the perception of words in reading and the conditions upon which the recognition of words depends, investigation has brought to light facts which have an intimate bearing on the methods employed to teach the child to read. This line of investigation began with the findings of the psychopathologist, on the basis of his study of cases of aphasia, that we normally read by the recognition of word wholes, and not by the recognition of individual letters. The earliest experimental work seemed to confirm this finding. One result was the development

of what is known as the 'look and say' method of teaching the child to read; that is, beginning with simple words rather than the letters of the alphabet. Subsequent investigation, however, has raised doubts whether these early conclusions are entirely accurate. It has been shown that in the recognition of a total word-form certain characteristic letters or letter-groups play a dominant part. It has also been shown that the process of word recognition is complex. There seems to be an early phase, in which there is a vague apprehension of the individual letters in groups without any definite order, followed by a phase in which the word is recognized with the apprehension of the meaning.[1]

Other subjects have been similarly studied, particularly writing, spelling, and arithmetic, though none so exhaustively as reading. In all cases, results of practical importance have emerged. In this field of applied psychology, however, a great deal still remains to be done.

III. PSYCHOLOGICAL METHOD OR TECHNIQUE

The practical application of psychological method has been partly involved in our discussion of psychological content. In psychoanalysis, for example, we employ with a practical aim in view methods which have long been used in the psychological laboratory to obtain an insight into mental processes. There is, however, an equally important development of applied psychology in recent times, which shows still more characteristically the application of psychological methods in the solution of practical problems. That is the employment of mental and

[1] For further information see Huey's *Psychology, History and Pedagogy of Reading.*

vocational tests, the development of which will be traced in subsequent chapters. In this case, as we shall see, methods which were originally developed by the psychologist with purely theoretical aims in view have been seen to be capable of extensive application in practical life. So important has this practical application become that the theoretical aims have been almost entirely fotgotten except for a small minority of psychologists.

CHAPTER II

INDIVIDUAL DIFFERENCES

WHEN experimental psychology first began, the main aim of the psychologist was to establish general laws such as were being established in the other sciences. Differences between one individual and another, and variations from time to time in the same individual, he regarded as disturbing factors in his investigations, and he sought to compensate for or eliminate these differences and variations in some way or another. Soon, however, it came to be recognized that, from certain points of view, and especially with reference to practical and biological problems, differences and variations in individuals had an interest in themselves. The result was the development of that branch of psychology known as 'individual' or 'differential' psychology.

The significance of this branch of psychology becomes clearly manifest when we consider the two complementary aspects of what may be called the practical problem of life in a modern civilized community. On the one hand we have the individual human being; on the other hand the physical, industrial, and social environment, in which he acts and to which he must respond. The community, composed of individuals, similarly responds as a whole to environing conditions. The more adequately the individual can respond to these physical, industrial, and social conditions, the more efficient will he be as a member of the community, and the progress of the community itself, and its life, will depend on the efficiency of

the individuals composing it. But because of individual differences in mental and physical endowment some individuals respond more efficiently to certain conditions, other individuals to other conditions. Hence in the organization of human effort involved in modern civilized life, it becomes a consideration of the first importance that the various functions to be performed in response to environing conditions should be entrusted to those most capable of performing them, while the various functions have, as it were, their counterpart in the various abilities, tastes, and capacities of the individuals composing the civilized community.

The pioneer in the study of the individual, so far as this country is concerned, was Francis Galton. Galton was mainly interested in the hereditary transmission of physical and mental characteristics. This necessarily led him to the study, not of the average human being, who only exists in the abstract, but of the concrete individual human being, as we find him living and working in the world of our everyday pursuits. In the course of his investigations Galton developed various methods of measuring and testing the different capacities of the individual, and valuable mathematical methods of deriving from his results information relevant to his problems. These methods and tests we shall have to consider later.[1]

While Galton's work was exceedingly important pioneer work, the progress made in the study of the individual would have been far less than it has been, if practical needs and practical considerations had not made their influence felt. The practical needs of applied psychology in every one of its different fields may be said to depend for

[1] See Chapter IV.

their satisfaction on some means of sizing up an individual's sensory and motor abilities, his general intelligence, his suggestibility, his memory, his character, or of determining in what respects and to what extent he varies from the ordinary run of human beings. These practical needs have from time to time called into existence various pseudo-sciences, such as phrenology, physiognomy, palmistry, and the like. Armed with the technical methods devised by Galton and perfected by many workers since his time, psychology can now with some confidence claim to be able to furnish in reality the information these pseudo-sciences pretended to furnish, and on a far more extensive scale, as well as in a far more definite way.

That this practical field was so long left to these pseudo-sciences was really due in large measure to the old conception of the nature and scope of psychology. While the definition of psychology as the science of the mind made its application in the one practical field of education apparently a matter of course, it prevented its application to other practical fields being thought of at all. As the science which studied the mind, psychology naturally directed its glance inwards to the workings of the mind, rather than outwards to the events happening in the workaday world. It represented at one and the same time the two things which the practical man has always felt disposed to distrust and fight shy of—the academic attitude of the mere theorist, on the one hand, and the self-conscious, brooding, introspective attitude of the mere dreamer on the other. As a matter of fact, this older psychology had little to offer the practical man. Even in education, beyond a few truths which the teacher could learn for himself without the aid of the psychologist, all it

had to offer was a mass of doubtful principles, the practical application of which was neither obvious nor easy.

The wide practical significance of the work on individual differences, however, may be said to have been realized almost from the very beginning. The importance of the results for education was at once apparent. The field of education has remained the field in which the most extensive use has been made of these results. This was, of course, only to be expected, since education has always looked to psychology for help and guidance. But it was soon recognized that these results had also a value and significance in the economic, the social, and the political fields, and if they were not equally important in these fields, it was clear that they were highly important in all.

The study of individual differences may be said to start with two postulates:

1. That, though the individual mind and character are unique, yet all individual human beings have the same underlying human nature.

2. That the differences between one individual and another can always be expressed as a more or less of particular qualities and capacities.

If, then, we can get an adequate analysis of human nature into qualities and capacities, and can devise tests to give us a quantitative estimate for each, it ought to be possible for us to obtain a precise and definite description or representation of the mental—or physical—make-up of any individual. If, further, we have applied our tests to a sufficient number of individuals to establish a norm or standard in each case, it is clear that we shall be able to see at once how any individual stands related to the average with respect to any trait or capacity which we

have succeeded in measuring, and to determine whether any particular individual possesses a certain capacity in the requisite degree for the performance of a certain function.

PSYCHOGRAMS

One of the most useful methods of representing an individual's make-up so as to yield us the information we require at a glance is what might be called the 'psychographic method.' In this we represent an individual graphically by means of a psychographic picture or psychogram. This may take on any one of several different forms, according to the type of figure and the principle of representation we select. The amount of deviation from a horizontal line, which represents the typical or average performance in the various tests, may be shown, or the amount of deviation from a vertical line in the same way. Or we may take a circle in place of a straight line as our basis of representation, a circle of a certain radius representing normal performance as before, and deviations from the normal being indicated by sectors, within or beyond that circle, of radii corresponding to the achievement of any individual in each test or group of tests. Then again the deviations themselves may be measured and shown in terms of various units. No general agreement, in fact, has yet been reached as to the best mode of representation.

A percentile basis for the classification of individuals is probably most useful and generally satisfactory. In this case we classify the individual as equal to the best 10 per cent., the best 20 per cent., or as good as, or better than, 90 per cent., 80 per cent., and so on, of all individuals tested, the average being of course represented by the

50 per cent. group. Graphic representation using this percentile basis will be most clearly understood from the accompanying Figs. 1 and 2. The one figure illustrates also the linear, the other the circular, form of psychogram. In Fig. 1 the lowest line represents the level below which none of the subjects falls; the second line

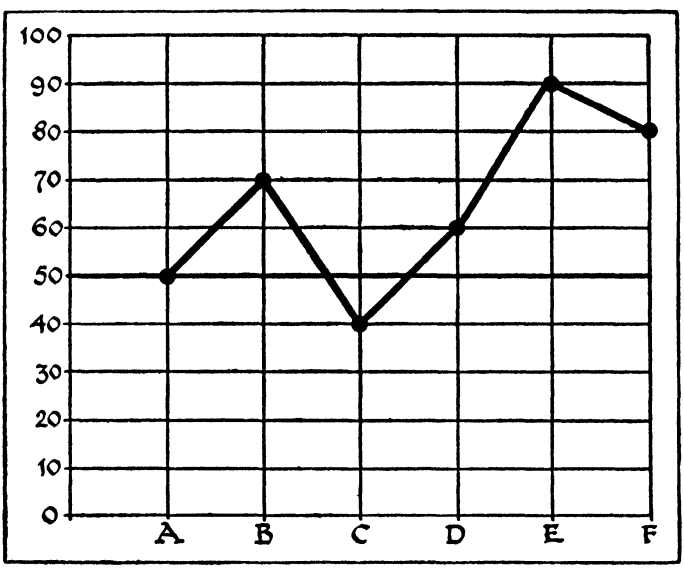

FIG. 1.

the level at, or below, which we find 10 per cent.; the third line the level at, or below, which we find 20 per cent., and so on; the top line representing the level at, or below, which all the subjects are found.

The perpendicular lines represent the characteristics A, B, C, D, E, F, which are being measured. Thus the individual whose psychogram is given is equal to the

average in characteristic A; as good as, or better than, 70 per cent. of all the subjects tested in characteristic B; as good as, or better than, 40 per cent. in characteristic C; as good as, or better than, 60 per cent. in characteristic D;

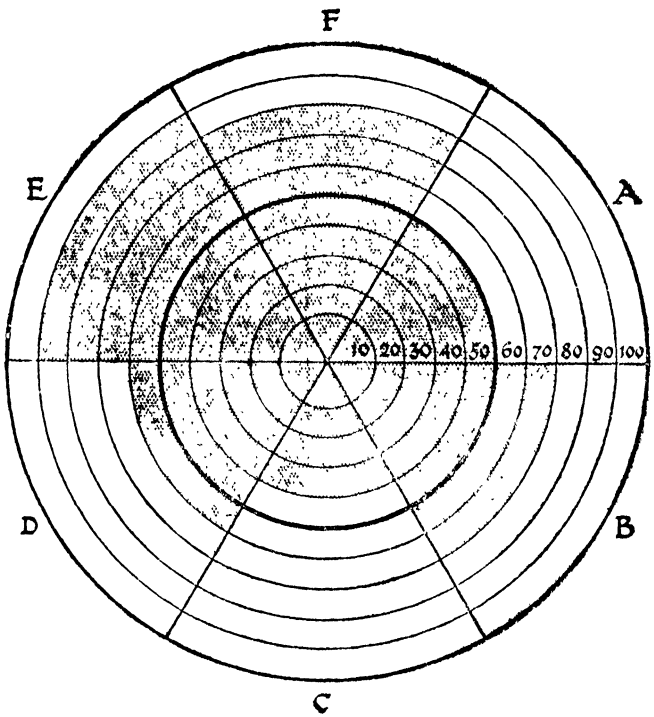

FIG. 2

as good as, or better than, 90 per cent. in characteristic E; and as good as, or better than, 80 per cent. in characteristic F. In E and F, therefore, he shows very superior ability, in B and D superior ability, in A average, and in C inferior.

In Fig. 2 is shown a circular psychogram for the same

individual. The radius of each sector indicates the standing of the subject in each of the tests respectively.

The psychographic method may be employed to show individual differences, alike over the whole range of mental functions, and in the special functions belonging to a restricted group; as, for example, memory for different kinds of material, or imagery in different sense departments. In the one case it gives us a general picture of an individual's mental make-up ; in the other a picture of a special aspect in fuller detail. In order to obtain reliable norms or standards a large number of individuals must be tested, and these should be as fair a sample as possible of the general population. At the same time it is generally desirable that percentile ratings should be with respect to the same race, age, and sex as the individual whose psychogram is represented.

MENTAL FUNCTIONS

We have now to consider the various mental functions to which test methods and methods of measurement have been, or can be, applied. The detailed treatment of mental tests will follow in a later chapter. The mentality of the human being presents three aspects, the cognitive—or better, intellectual—the emotional, and the volitional. The science of mental measurement has not yet made such progress as to enable us to get an adequate quantitative estimation of all the functions involved in each of these aspects. Before this is attained much still requires to be done, particularly with respect to the emotional aspect. Nevertheless, though there are still gaps to be filled, a great deal of progress has been made, and further rapid progress is taking place every year.

The aspects of an individual's mentality, which have

been studied in some detail and for which tests have been devised, may be classed under seven heads—sensory efficiency, motor efficiency, rapidity of reaction or response, attention, memory, imagination, and relational thinking. Under each of these heads several specific functions are included, each of which can be tested and measured separately. Thus the measurement of an individual's sensory efficiency will involve the testing of his visual and auditory acuity, his colour and pitch discrimination, his discrimination for pressure, for temperature, for visual and tactual distance, and so on. In the same way the measurement of an individual's motor efficiency will involve testing for rapidity and precision of movement respectively, for steadiness of motor control, for accurate co-ordination of hand and eye, perhaps even for muscular strength.

SENSORY EFFICIENCY

As far as practical life is concerned, vision and hearing are the important sense departments, and tests in these fields have a far wider sphere of application than tests, say, of acuity of taste or smell. In the assessment of an individual's capacities from a practical point of view, we can seldom neglect visual acuity, colour discrimination, and auditory acuity. Pitch discrimination has not the same general importance. As regards the other sense departments, while individual differences are as characteristically present as in vision and hearing, it is only in special cases that these differences become practically significant—that is, significant with respect to a person's industrial or economic efficiency.

The ordinary tests for acuity of vision are well known. These are the cards of letters—Snellen's types—which

every optician uses. These consist of lines of letters of different sizes, which are standardized for the distance at which they can be read with normal vision. Their employment has several disadvantages. Relative familiarity with the letter forms will obviously facilitate their recognition. The totally illiterate cannot be tested in this way at all. Moreover, individuals differ in their readiness to commit themselves to what is partially a guess, so that one individual will read a letter from faint clues, which are also visible to another individual, who nevertheless fails to read it because he hesitates to commit himself.

This has led to the devising of other forms of the test which aim at avoiding the defects of Snellen's types. Thus Cohn's test for illiterates makes use only of a large 'E' placed in various positions. The subject is supplied with a large 'E' in cardboard, and is told to place that in the same position as the 'E' pointed to or exhibited. The E's may be arranged in lines varying in the size of the letter as in Snellen's test, or they may be exposed one at a time. Seitz's test again uses pictures in place of letters—a horse, a dog, a cat, a bird, etc.—the arrangement being as in Snellen's test. Perhaps the most interesting modification of this test is that due to McCallie. This consists of ten cards. On each there is the picture of a boy, a girl, and a teddy-bear, each of them with a hoop. In one of the hoops there is a ball of such a size that it subtends at the distance at which it is seen by a person of normal vision an angle of one minute at the eye. The subject is required to locate the ball, that is, to say in which loop it is. This modification of the test is specially useful in testing children.

Variations in colour discrimination have assumed very considerable practical importance under the conditions

of modern life. Though there are few occupations in which a high degree of discrimination is essential, there are many where marked defect becomes a serious handicap, and some—such as the railway service, the mercantile marine, and the navy—to which admission is definitely barred by marked defect. When it is remembered that at least 6 to 7 per cent. of males are so seriously defective in the discrimination of red and green as to be rated as colour blind, and that these are the colours commonly used for light signals, the practical importance of normal colour vision will be realized. Colour discrimination is tested in various ways. For the accurate determination of degrees of colour discrimination, the only reliable method is the comparison of spectral lights. The Hue Discrimination Spectrometer, made by Adam Hilger for the University of Edinburgh Psychological Laboratory, has been devised for this purpose. With this apparatus it has been found that there are very great differences of discrimination even among individuals with apparently normal colour vision, and for different regions of the spectrum.

Tests for the colour defect known as colour blindness are fairly numerous. When tests first began to be used for the examination of the colour vision of engine drivers and officers in the mercantile marine, skeins of differently coloured wools were used. The subject was handed a test skein, and told to find all the other skeins which were approximately of the same colour out of over a hundred skeins spread out irregularly in front of him. This test was first systematized by Holmgren—hence generally known as the Holmgren Wool Test—and he used as test skeins a very pale green, a light pink, and a bright red. It has been claimed in recent years, particularly by

Edridge-Green, that the wool test is not at all a reliable test for colour blindness; that it may, indeed, allow dangerous colour blindness to remain undetected. It is doubtful whether the defects of the test are so serious as Edridge-Green alleges, but it seems certain that Holmgren's test skeins are not the most suitable. Dr. Mary Collins [1] tried out a number of different test skeins, and found that the bright red was not reliable, but the pale green and the light pink were on the whole satisfactory, while a magenta skein was also very useful. She agrees with Edridge-Green in recommending that the subject should also be asked to name each colour as he selects or rejects it, and finds that when the test is given with these modifications it is fairly reliable.

The mere naming of colours, however, is by no means a reliable test. Colour-blind individuals learn to distinguish between different colours on the basis of differences of brightness. They hear other people call a certain brightness red and another brightness green, and so learn to name colours with a considerable degree of accuracy, although they do not really see the colours at all. It is possible, however, to make naming tests reliable by using coloured lights in a systematic way. The best-known test for colour blindness on this basis is the Edridge-Green Lantern. This is the final criterion officially adopted by the British Board of Trade and British Admiralty. Tests with the Edridge-Green Lantern can be made very stringent—perhaps needlessly so—but it is quite certain that no colour defect potentially dangerous with respect to signal lights can escape detection by these tests.

Other practically useful tests for colour blindness are

[1] *Colour Blindness*, pp. 64 ff.

the Ishihara Tests, Nagel's Cards, Stilling's Pseudo-Isochromatic Tables, Podesta's Wall Charts, Schaaff's Mosaic Tables, and Collins and Drever's Group Test for Colour Blindness. All these, except Nagel's Cards, are essentially the same in principle. Letters, numbers, or figures are formed by patches of colour on a background composed of similar patches in a colour which the colour blind confuse with that of the letters, numbers, or figures. The test is either to read the letters or numbers, or in the case of Schaaff's test, to indicate the gap in a circle. When there is failure to distinguish between the figures and the background, the subject sees nothing on the page except irregularly disposed patches varying in brightness. If he is asked to name the colour of these patches, he may be right in some cases, but he is entirely wrong in others. He may, in fact, name rightly the colours on the page, though he names wrongly individual patches, and he is quite unable to see any number, letter, or figure, or sees a wrong one. A similar Card Test has been devised by Edridge-Green, but it is much too difficult for general use, and may classify, with the colour blind, individuals whose colour vision is not very much below normal. The Nagel Card Test is more or less analogous to the wool test, except that coloured dots on cards are used in place of skeins of wool, the individual being asked to point to cards containing red dots, red dots only, green dots only, grey dots only in turn.

The testing of auditory efficiency can be carried out in a more or less analogous way. A simple test for acuity of hearing is the 'whisper test.' The experimenter, standing at different distances behind the individual to be tested, whispers directions or words to be repeated. If the hearing of each ear is to be tested separately, this can

be done by stopping each in turn with cotton-wool. The tick of a watch at different distances may also be employed. In this case the watch should be a stop-watch. Otherwise we have no objective control, and must depend entirely on what the subject says, which may be very unreliable, even without any intention to deceive.

While rough-and-ready methods of this sort have some practical value in the determination of gross defects of hearing, they are not sufficiently accurate for purposes of scientific measurement, or to determine fine differences in degree of auditory efficiency in individuals with normal hearing. For such purposes some form of audiometer must be used. The most widely known audiometer is that devised by Seashore. This is a very handy and portable instrument by means of which the acuity of hearing in each ear can be separately measured with considerable accuracy. It has, however, some disadvantages which are avoided in the newer and more elaborate audiometers. The range of intensity of the sound given is not sufficiently wide for general purposes of testing. Moreover, the individual tested knows which ear is being tested at any time, and malingering, therefore, cannot be excluded. This second defect could be readily removed by providing two receivers, one for each ear, in either of which the sound could be produced, without the subject's knowing which unless he actually heard it. The first defect is not so easily remedied, and more elaborate and costly audiometers, like those made by the Bell Telephone Company,[1] may be required, if it is necessary to employ a wide range of intensity. Where it is desirable to use tones of widely varying pitch, the Seashore audiometer is also at a relative disadvantage, though much can be done in

[1] Or Western Electric Company.

the way of appropriate modifications to minimize this disadvantage.

As in the case of vision, there are considerable individual differences in acuity of hearing even among normal individuals, and these differences may have great practical importance in various occupations. There are also differences—often very marked—in the same individual between the acuity of hearing in the two ears. Moreover, there are differences in the pitch-range audible to different individuals. A high note may be quite inaudible to one person while it is easily heard by another. Both auditory acuity and pitch-range decrease with increasing years, the decrease of the latter showing itself, as a rule, at a much earlier age than any diminution of the former.

Pitch discrimination also varies from individual to individual. It is a well-known fact that some people are musical and some not. The difference between the musical and the unmusical may be due to difference in acuity of pitch discrimination, though what is spoken of as ' lack of an ear for music ' is sometimes attributable to a defect of musical memory, rather than, and without, any defect in pitch discrimination. The differences in pitch discrimination, however, from one individual to another are very great. A specially fine musical ear can discriminate a pitch difference of less than half a vibration through a fairly wide range of the musical scale, while at the other extreme we find persons who cannot discriminate between tones differing by ten or fifteen vibrations. That is to say, one person may have an ear twenty or thirty times more acute than another for differences of pitch. It would be extraordinary if such a difference had no practical significance.

That analogous differences are found in the other sense

departments almost goes without saying. These differences, however, have not the same wide significance for practical life. Nevertheless, there are cases where the acuity of sense other than vision and hearing may have practical value. The wine-taster and the tea-taster must necessarily have acute taste and smell, and a delicate sense of touch is important in not a few lines of practical activity.

MOTOR EFFICIENCY

The measurement of motor efficiency involves, as we have seen, a testing of rapidity and precision of movement, steadiness of motor control, co-ordination of movements, muscular strength, and the like. Co-ordination of movement should perhaps be called sensori-motor ability, since it necessarily involves sensory as well as motor functions.

Rapidity of movement is generally tested and measured by means of some form of tapping test. An ordinary telegraph operator's tapping key may be used. The subject is asked to tap as quickly as he can for thirty seconds, the taps being recorded on a smoked drum, or counted by means of some kind of electric counter. He may be required to tap with one finger, or by holding the key as the telegraphist holds it, with the right hand or with the left. With practice as high a rate as 500 taps per minute can be attained, if the telegraphist's grip is employed, but 360 taps per minute may be taken as a normally good achievement. Again, there are very considerable individual differences. In place of a tapping key, a tapping board and style may be used, and with this either hand movement or arm movement may be tested. McDougall has devised a form of the tapping test which is

often useful. In this test Veeder counters are arranged on a wooden base, usually four in a row. The subject holds a wooden rod tipped with rubber, and strikes each of the counters as rapidly as he can for fifteen seconds, changing from one to the next on the word 'now.' He thus taps for a minute altogether, and since the minute is divided into fifteen-second periods, the rate of tapping for each being recorded separately, it is possible to obtain some information, not only regarding his maximum rate of tapping, but also regarding his fatiguability, and also to some extent his persistence against the onset of fatigue.

Accuracy and precision of movement may be tested in various ways. Several forms of aiming test have been developed. The simplest is perhaps the 'target board' test. In this test a board is suspended against a wall in such a way as to be adjustable to the height of the subject. On the board is fastened a sheet of paper with ten crosses irregularly arranged on it. The subject stands at arm's-length from the board, and with a pencil tries to strike the intersection of the lines in each cross in time with the beating of a metronome set at sixty. His accuracy is measured by the mean of his deviations from the exact intersection. The test may be varied by using millimetre squared paper placed on a table in front of the subject, the instructions being to strike with a pencil the exact corner of every alternate large square. In another type of test, which tests precision of movement rather than accuracy in striking a point aimed at, the subject is required to draw a style between two brass plates, which are arranged so that the edges gradually approach one another, without allowing the style to touch either plate. As soon as he touches either, an electric bell rings, and a scale is placed along the line of the V-shaped space be-

tween the plates to enable the experimenter to measure the distance to the first contact, which is the basis of the measurement of precision.

The standard test for steadiness of motor control is a metal plate pierced with a number of holes of varying diameters. The subject has to insert a style in each hole in turn in time with the beating of a metronome, and to hold the style in each hole for a certain number of beats. The whole is arranged in an electric circuit, as in the test for precision, so that a bell rings as soon as the style touches the side of any hole. The test may be given either with the forearm free or with the forearm resting on the table or desk.

Co-ordination may be tested in a great number of ways. Generally speaking, the method employed by any experimenter depends on the particular problem, theoretical or practical, which he has in view. Muscular strength is usually tested by means of some form of dynamometer. A familiar form of dynamometer is that used to test strength of grip, but dynamometers may be constructed to test the strength that can be exerted by almost any muscle or group of muscles. Various more or less complex motor tests, such as card-sorting, marble-sorting, and the like, have been employed to test what is usually designated sensori-motor ability. These tests are not essentially different from some of those already described.

Closely allied to the testing of motor ability is the measurement of an individual's reaction time. The reaction time is the time taken to respond to a simple signal by pressing or releasing a reaction key. The signal may be a sound, a light, or a touch. The standard method of measuring reaction time employs a chronoscope, which depends upon either clockwork or a syn-

chronous motor. The hands, moving over a dial, are engaged and disengaged electrically. The giving of the signal closes (or opens) an electric circuit, and the subject's response opens (or closes) the same circuit, the hands moving over the dial during the time elapsing between the two operations, and thus recording the time taken for the reaction. Reaction time varies with the individual, as well as with his age, general condition, direction of attention, etc.

In addition to measuring the simple reaction time in this way, we may measure what is called the 'discrimination time,' that is, the time taken to discriminate and respond to only one out of several stimuli given. Or we may measure the time for discrimination and choice, that is, the time taken to discriminate and to react differently towards different stimuli—say with one finger to one stimulus and another finger to another stimulus. Individual differences in reaction time, and particularly in the time for discrimination or discrimination and choice, may have a very important practical bearing. This was one of the tests applied to candidates for the air service in several belligerent nations during the two Great Wars.

ATTENTION, MEMORY, ETC.

In a more or less analogous way individual differences in attention and in memory have been tested and measured. In the former case it is not very clear what we are testing, and the precise significance of the results is not very obvious, temperamental differences evidently influencing them to a marked extent. The tests employed have usually been some variety of the 'cancellation' test. In this test the subject is required to cross out specified letters or digits in specially prepared material, or letters

in a page of ordinary print. McDougall's 'dotting' test is a variation of this, where the subject is required to mark with a pencil the centre of small circles on a band of paper passing under a slit of appropriate width, at a constant and appropriate speed.[1] Whatever we are testing by such tests, it is certain that marked individual differences in efficiency show themselves, as also marked differences in the way in which efficiency is affected by distracting stimuli, and the practical significance of such differences is not for a moment in doubt.

The case of memory is somewhat different. Here we do know more or less what we are testing. There are individual differences in rapidity of learning, in durability of retention, in accuracy of reproduction. There are variations in the efficiency of learning for different kinds of material, some individuals learning one kind of material best, other individuals another kind. There are differences in memory span; that is, in the amount that can be recalled when the material is presented only once to the ear or to the eye. Finally there are differences in the type of imagery employed by different individuals, when trying to recall something to mind. Some individuals recall mainly in terms of vision—they see with the mind's eye—others mainly in terms of hearing—they hear with the mind's ear. All these differences may be practically important, and all are capable of being tested and measured by appropriate methods.

We have not yet exhausted the range of individual differences. There are also important differences in emotional, temperamental, and volitional make-up. A great deal of work still remains to be done in this field. Emotional, temperamental, and volitional differences between

[1] See also p. 204.

one individual and another are very patent in ordinary life, but when we make the attempt to test and measure these differences, we find the task a far from easy one. It might indeed be said that no reliable test of emotional and volitional characteristics has yet been devised. There is no lack of tests of a kind, as we shall see in a later chapter, but what we are testing in each case, and the interpretation to be given to our results, remain very obscure. The study of emotion by objective methods has made considerable advances within recent years, but the measure of emotionality still presents the most formidable difficulties, and, as regards temperament, psychologists are still at variance as to what it is. The fact is, that in dealing with emotion, temperament, and will, we are dealing with the very core of human personality, and this is so extraordinarily complex that progress must necessarily be slow. We can only say that in this field a beginning has been made.

RESULTS

The results of these investigations of individual differences may be made to throw great light on a number of important general problems. In particular there are three such general problems, which have at all times claimed the attention and evoked the interest both of the scientist and of the man in the street. These are : (1) differences in mental endowment arising out of differences of sex, (2) differences dependent on differences of race, (3) the respective influences of heredity and environment in the determination of an individual's mental make-up.

The differences between the sexes, as they present themselves in the men and women of a civilized community of the modern world, are so obvious and striking that we are apt to prejudge the question whether there are profound

natural differences between the sexes as regards mentality, and answer without hesitation: "Of course there are." When, however, we attempt to specify these differences, and to support our specification with reliable evidence, we find the task surprisingly difficult. There are, of course, physical and physiological differences in the primary and secondary sexual characters. It is the deeper differences of mind and character that elude us when we seek to specify them.

Take general mental ability. A considerable quantity of data concerning the efficiency of the two sexes in different mental functions is available. These have been collected and summarized by Thorndike, and the general nature of his findings is shown in the following table:

TABLE I

Colour tests	Men very inferior.
Sensory discrimination generally .	Men inferior.
Retentiveness and memory . .	Men slightly inferior.
Ingenuity	Men superior.
Motor efficiency	Men very superior.

The best way to compare two groups is to record the percentage of one group reaching or exceeding the median, or middle value, of the other. When the two groups are equal, the percentage will be 50. In the above table for the first function 24 per cent. of men reach or exceed the median of women; for the next 43 per cent.; for the third 47 per cent.; for the fourth 63 per cent., and for the fifth 70 per cent. This might be said to indicate generally that women are superior to men on the sensory side, men to women on the motor side. Environmental and training differences have not been eliminated, and these might to a large extent account for the differences found. At the

same time, these results are in accord with general impressions. On the other hand, the enormous amount of data now available from intelligence tests, which are intended to test native ability, affords little support for the view that there is any marked difference in general mental ability between the sexes.

Failing a difference in general mental ability, it has been suggested that men show a greater range of variability than women. This would be a very important difference if it could be substantiated. It would mean that, though the averages of the two sexes were pretty much the same, the highest ability—and also the lowest—would be shown by men. The list of names of those who have stood out as the intellectual leaders in their own generation throughout the centuries would seem to support this contention, but it must be remembered that environment, custom, and tradition have all conspired to restrict the activities of women in every century, including even our own. Again, the evidence from actual test results affords little support to the view that men show a significantly higher variability.[1]

There still remains the possibility that there are important differences in emotional equipment—in disposition and character—between men and women. Our measurement, however, of these aspects of mentality is still so crude and unreliable, that in the meantime judgment must be suspended until some methods of more accurate assessment are available. That there are emotional differences few would care to deny, but there is possibly as much overlapping of the sexes in emotional as in intellectual equipment.

[1] See, however, *The Intelligence of Scottish Children* (London University Press).

The question whether, and to what extent, there are mental and emotional characteristics peculiar to different races becomes a very important practical problem in countries where the population consists of distinct racial groups. Popularly a Frenchman is supposed to have a different intellectual and emotional make-up from an Englishman, and both from a Scot or an American ; while the Oriental—Jap or Chinaman or Burmese—is supposed to differ still more markedly from the European. The experimental investigation of problems of this kind has hitherto been confined to simple mental functions like sensory and motor efficiency, and there is no evidence with respect to complex intellectual and emotional characteristics upon which to base a decision regarding the accuracy of the popular view in this matter. Such evidence as there is, however, would seem to indicate that innate racial differences in the basal mental functions are relatively slight, and that there is much overlapping. It may well be, therefore, that, except as between the highly civilized peoples and the most backward races, the differences which have impressed the popular mind are due almost wholly to environmental factors and social traditions. There is a considerable quantity of experimental evidence on which to base a comparison between the American negro and the American white population, especially with respect to intelligence. In this case it would seem that significant differences in favour of the white exist, both with regard to mental level attained and with regard to range of variability. But even here there is much overlapping.

Our final problem with respect to the relative influence of heredity and environment in an individual's mental make-up, though a problem that has attracted a great

deal of attention from the earliest attempts at the measurement of individual differences, is one that is essentially insoluble in the form in which it is usually presented, unless we could entirely eliminate environmental influences. What can be, and has been, done, however, is to measure the extent to which members of the same family—father and son, mother and daughter, brothers and sisters—have similar mental characteristics and endowments. On the whole, it has been shown that mental resemblances between blood relations are as striking as physical resemblances. Some very interesting work in this connexion has been done by investigating the resemblances between twins. As a result, it appears that identical twins resemble one another mentally to about double the extent that other members of the same family resemble one another.

CHAPTER III

CHILDHOOD AND ADOLESCENCE

PERHAPS no branch of psychology has a wider practical significance than the psychology of child development, since one of the most important functions of the adult community in any civilized State is the education of the young, and the education of the young must depend on an adequate knowledge of the normal processes of development from the child to the adult. It is not the intention of the present work to discuss educational psychology as such; that has grown into a separate branch of the science. Without a discussion of the phenomena of child development, however, no treatment of applied psychology could be considered complete, and such a discussion, it will be found, has wider bearings than the education of our schools.

In the civilizations of the Ancient World, and in the civilized countries of Modern Europe almost till the end of the eighteenth century, the training and education of the child practically ignored the psychology of the child. It was assumed that the child's mind, or rather mentality, differed quantitatively, but not at all qualitatively, from the mentality of the adult. That is to say, the child was regarded simply as an adult in miniature, mentally as well as physically. Rousseau, Pestalozzi, and Froebel initiated a movement in education the full effects of which are only now being felt, and of which the main characteristic was the transferring of the teacher's interest from the subject-matter to be learned to the child to be educated.

This necessarily involved the direction of attention to the psychology of the child. At first the psychology of the child was deduced from general principles, in the same way as the current adult psychology was deduced from general principles. But with the development of the empirical attitude and experimental methods in general psychology, the actual observation of the phenomena of child development was undertaken by an ever-increasing number of workers. The earliest result of this was the somewhat nondescript body of unsystematized and unsifted observations designated 'child study,' which gradually gave place to, or merged into, the child psychology of to-day.

While it is perhaps true to say that at each stage of his development the child is a different being, as far as his reaction tendencies, interests, modes of thought, etc., are concerned, it must never be forgotten that one stage passes imperceptibly into another, so that at no point can one say that here one stage ends and another begins. The stages themselves, indeed, are by no means easy to define with any degree of precision. Their limits appear to vary according to the basis upon which we seek to determine them—physical, intellectual, emotional, or social.

Meumann[1] has formulated three important laws in accordance with which the development of the human being takes place. These are:

1. Development is itself determined in decisive fashion by innate rather than by environmental factors.

2. The most necessary and fundamental biological functions are earliest developed.

3. Mental and physical development show periodic, and on the whole alternating, fluctuations.

[1] Rusk : *Experimental Education*, p. 23.

Basing on the last two of these laws, we may distinguish the stages of development as follows:

1. Period of first 18 months, that is, the period of infancy, when the fundamental functions are established.
2. Period of mental growth from 18 months to 4 years.
3. Period of physical growth from 4 to 7.
4. Period of mental growth from 7 to 11.
5. Period of physical growth from 11 to 14.
6. Period of mental growth from 14 to 18.

With these periods, the periods we can mark off on psychological and educational grounds show considerable correspondence. These are:

1. First Formative Period—pre-school period—up to 5 or 6.
2. First Transition Period—infant school period—5 or 6 to 7 or 8.
3. Second Formative Period—primary school period—7 or 8 to 11 or 12.
4. Second Transition Period—secondary school period—11 or 12 to 18.

The designations 'formative' and 'transition' are due to Stanley Hall, and a very interesting hypothesis or speculation is associated with them. The second transition period is of course the period we call adolescence, which is very appropriately described as a period of transition. But according to Stanley Hall there is an earlier period which possesses many of the same characteristics. This is the period from 5 or 6 to 7 or 8, which is a period of rapid growth on the physical side and of expanding interests on the mental. Stanley Hall supposes that at some remote evolutionary epoch this period represented the adolescence of man's pre-human ancestors, and that subsequently a new storey, as it were,

was added to make the human edifice, so that we thus get a second transition period, the adolescence we now know.

The development of what we call 'intelligence' during these periods will be considered, at least by implication, in a succeeding chapter. Intelligence, however, is but one aspect of mentality affected by development, and so far as development is modified by conditions in the environment, the 'intelligence' tested by mental tests is assumed to be practically uninfluenced. Hence any discussion of mental tests must necessarily ignore many problems of childhood and adolescence which are of enormous practical importance. To some of these problems it is intended in the present chapter to call attention.

For practical purposes the most appropriate order of treatment of these problems is based upon the periods of development as delimited by school education. This marks off for us three periods: (1) the pre-school period and the period of the infant school or kindergarten, that is, the period of development up to the age of 7; (2) the period of the elementary or primary school, that is, the period from 7 to 11 or 12; and (3) the period of the secondary school and after, that is, the period from 12 to 18 or 20—the period of earlier and later adolescence. These periods we shall consider in turn.

I. EARLY CHILDHOOD

The first two or three years of a child's life might be regarded as a sub-period, marked off from the period of later infancy by the acquisition on the part of the child of language, and thus of the ability to enter into more complex relations with his social environment. The

earlier period, however, is still largely a *terra incognita* so far as mental life is concerned, apart from the rather obscure facts revealed by psychoanalysis, and the hazardous and doubtful speculations based on these facts. All that we can be certain about is derived from the direct observation of the child from the moment of birth onwards.

The earliest movements of the child have been classed under three heads, as impulsive, reflex, and instinctive, respectively. Impulsive movements are defined as random movements which are apparently uncaused or spontaneous. In most cases these movements are probably evoked as a result of stimulation within the bodily organism, but under the circumstances we naturally know nothing of such stimulations. Their random character may also be only apparent. In fact, the recognition of this group of movements merely testifies to our ignorance of what is going on within the infant organism.

A reflex action in the strict sense is the direct and immediate response of an effector or group of effectors to the stimulation of a receptor. This definition requires explanation. The behaviour of a human being is the total response which he makes to the situation with which he is faced. In general, the response consists of certain adaptive activities appropriate to the conditions imposed by the situation. The carrying out of these adaptive activities is provided for by the complex system of interconnected living cells which we call the psycho-organic system. This system consists of three parts—a part specialized for the receiving of stimulations arising from changes in the environment or in the body tissues, a part specialized for making the necessary response to these

changes, and a part specialized for keeping the other two parts in communication with one another. The first part is found in the special cells which form the essential parts of our sense organs. These cells are called the 'receptors.' The second consists of the muscles and glands, which we speak of as 'effectors.' The third, or 'connector' part, is the nervous system. We see then that a reflex action is the action of a muscle or gland—or several muscles or glands—which is produced by, and follows immediately upon, the stimulation of some sense organ, owing to a more or less direct connexion between muscle or gland and sense organ through the nervous system. Thus a bright light falling upon the retina of the eye causes the pupil of the eye to contract, because there is a connexion through the nervous system between the receptor cells for light in the retina and the small muscles in the iris of the eye which make the pupil smaller by their contraction. The contraction of the pupil is therefore a reflex action.

Recently the notion of reflex action has been very much extended, and some writers class any action whatsoever as a reflex. The widening of the sense of the word 'reflex' is largely due to the influence of the Russian physiologist Pavlov. Studying the secretion of saliva in dogs, Pavlov found that this was normally produced in the first instance by the presence of food in the mouth, but could later be produced by the mere sight of food, or the ringing of a bell which had always previously accompanied feeding. The original response he called an 'unconditioned' reflex, the response when given to the sight of food or the ringing of the bell, a 'conditioned' reflex. He and his followers went on to argue that all learned responses could be interpreted as con-

ditioned reflexes, and consequently the notion of reflex could be made to cover all behaviour. The theory underlying this view need not be discussed here. Of course there is a sense in which it is true that our most complex behaviour can be analysed into the responses of the individual muscles and glands which compose its pattern. It seems obvious, however, that with these physiologists the term ' reflex ' has entirely lost what was essential in its original meaning, and that the word is no longer necessary if we adopt Pavlov's theory, since the word ' response ' will serve all purposes equally well. In what follows we shall adhere to the original meaning.

Instinctive actions are more complex than simple reflexes. There are three essential differences between the two types of action. Whereas reflex action is the response to a stimulus, instinctive action is the response to an object or situation. Instinctive action is not like reflex action—immediate, inevitable, and unvarying. In instinctive action mental process always participates, whereas in reflex action it is never more than a mere onlooker, and sometimes not even that.

The child's instinctive behaviour is so important from a practical point of view that we must give it somewhat detailed consideration. It has frequently been maintained that, as compared with the lower animals, the human being has few instincts. The fact is, of course, that we do not find in the human being the ability to perform complex series of acts without learning and without experience. If this is taken as the characteristic mark of instinctive behaviour, then we cannot but admit that the human being has few instincts. What is most characteristic of instinctive behaviour, however, is not this innate provision of a stereotyped series of acts, but the urge or

'drive' behind the behaviour. The higher an animal is in the scale of intelligence the more the series of acts constituting instinctive behaviour may be varied according to circumstances, but evidence of the inner 'drive' behind the behaviour is clear at all levels. As a matter of historical fact, the word 'instinct' from the beginning has meant these inner 'drives,' rather than the stereotyped behaviour in which they issue among the lower animals. It must not be forgotten that in the human being these 'drives' are experienced as impulses, and this is undoubtedly the origin of the concept of 'instinct.'

In the child relatively few instinctive 'drives' or impulsions manifest themselves at birth, but it is not long before many are in evidence. Thus the impulse to grasp for objects in the field of vision, the impulse to make sounds, the impulse towards locomotion, all fundamental in the early acquisitions of the child, soon make their appearance. The very important impulses associated with powerful emotions, like anger and fear, also give evidence of their existence at an early period. The impulses to play, to imitate, to experiment, are perhaps somewhat later, but not markedly so. The only instinctive impulses that are tardy in manifesting themselves, except in the most rudimentary way, are those associated later with sexual and social behaviour.

While the reader must be referred to treatises on general psychology for a complete enumeration and classification of the instinctive impulses of the human being, one or two of them are so important from several practical points of view that it is impossible to omit some consideration of them here. Of these, probably the most important is the impulse to escape, which is usually accompanied by the powerful and distressing emotion we call fear. In the

adult the impulse and emotion are evoked by any situation threatening danger or hurt to oneself or to a loved object. The question has often been asked whether there are any situations evoking the impulse and emotion in the young child independently of all experience. Experimental investigation and careful observation seem to indicate that the sudden withdrawal of support, a sudden loud noise, and the feeling of choking, all evoke the instinctive impulse on the first occasion. Other fears seem to be acquired as a result of experience, or by associating with people who exhibit these fears. The feeling evoked by the feeling of choking is rather interesting. This is probably one of the first feelings the child ever experiences, when he is first ushered into a strange world, and for the first time requires to use his breathing apparatus. His first cry may thus be a cry of fear due to the feeling of choking, instead of a cry of rage " at the catastrophe of being born," as Kant conjectured. Psychoanalysts at least hold that the child's first fear and his first impulse to escape are experienced at the moment of birth, and that subsequent fears are a reinstatement of this original fear. In the Pressey X-O Tests it has been found that ' suffocating ' is one of the words most frequently ' circled ' among the worries and anxieties.[1]

Fear is at once the most disagreeable and the most crippling of the emotions. It is important therefore that the development of unnecessary and excessive fears in childhood should be avoided. Unwise treatment of children is a not infrequent cause of fears and anxieties in after-life, which tend to impede and pervert all action. Many of these fears have their origin in the attitudes of

[1] Collins: " British Norms for the Pressey Cross-Out Test," *British Journal of Psychology*, vol. xviii, pp. 121–33.

those with whom the individual was in contact in childhood—parents, or nurses, or other children. In particular, children's fears should not be exploited, either in order to control them or to amuse grown-ups.

Two other instinctive impulses of fundamental importance are the aggressive impulse and the impulse to seek recognition. The first is usually associated with the emotion we call anger, and is evident in the child from an early age. The impulse and emotion are called into play by opposition or thwarting. In the young child the outbursts of anger are generally crude, but the impulse when brought under control, and directed towards the overcoming of obstacles, is an almost essential element in a strong character. The impulse to seek recognition is commonly spoken of as the impulse towards self-expression or self-display. As a matter of fact, the impulse seems to change its character as development proceeds. At first it appears to be merely an impulse on the part of the child to attract attention, to make other people take notice of him. Later it is an impulse towards self-display, and is satisfied only with the admiring regards of other people. In some cases it may become an impulse towards securing power over other people. This impulse is of course the basis of that proper pride which is the chief element in self-respect. If it meets with constant bafflings and disappointments, the child is apt to lose all confidence in himself, and to develop a sense of inferiority which is almost as potent as crude fear in inhibiting action.

These three instinctive impulses—escape, aggression, and self-display—probably play the chief part in the development of the child's character. It is now necessary to trace briefly the manner in which this development

takes place. The development of which we are now speaking may be called emotional development to distinguish it from the development of intelligence. It is really development of the feelings and the will. Four main laws of emotional development have been formulated, and two of these are undoubtedly of first-rate importance. The laws are : the law of selection, the law of transference, the law of inhibition by habit, or rather by sentiment, and the law of development by stimulation. The first two are fundamental; the other two more limited in their scope, and of less, but by no means minor, importance.

The law of selection is a general law regulating the behaviour of every living organism. Behaviour that involves unpleasant results tends to be discontinued, and behaviour involving pleasant results to be confirmed. This might be taken as a simple statement of the law. The law of transference is almost equally wide in its reference. If a strong feeling or emotion is experienced in connexion with any object or action, whenever that object or action is met with or occurs again the feeling or emotion will tend to be experienced again. When a living organism is capable, as in the case of the human being, of bringing again before the mind past objects or events in the form of memory images or ideas, the images or ideas will in such a case be emotionally coloured because of the strong feeling experienced in the past. We speak then of a 'sentiment' having been established in connexion with that object or event. For example, a child performs an act which meets with marked disapproval from his elders, and for which, therefore, he feels deeply ashamed. Not only will he tend to avoid such an action in future—law of selection—but whenever the thought of the action

comes into his mind, the feeling of shame will be experienced.

These two laws cover phenomena which play a leading part in the development of every human being. They are the laws in accordance with which sentiments, and what are called ' complexes,' are built up, and sentiments and complexes represent the emotional make-up of us all. The third law, called by William James the ' law of inhibition by habit," merely covers a particular way in which the existence of a sentiment manifests itself. James states his law in these terms: " When objects of a certain class elicit from an animal a certain sort of reaction, it often happens that the animal becomes partial to the first specimen of the class on which it has reacted, and will not afterwards react on any other specimen."[1] The examples James chooses to illustrate the operation of the law are the selection of a mate, of a particular hole to live in, of a particular feeding-ground, and so on. What happens in these cases is clearly that certain objects having become associated with emotional experiences, sentiments are formed in connexion with them. Consequently subsequent behaviour towards objects of the same class may be profoundly modified.

The word ' complex ' is frequently employed by present-day writers, especially those of the psychoanalytic and kindred schools, to cover phenomena of this kind. Unfortunately the word has been used in so loose and confusing a way that the reader is often at a loss to understand what the precise phenomena are to which the word is rightly applied, and why the word is needed at all seeing that we already have the word ' sentiment.' This seems the proper place to clear that matter up. The two words

[1] *Principles of Psychology*, vol. ii, p. 394.

are certainly needed if our description of phenomena is to be accurate and our thinking precise. Three words are in fact needed, and we already have all three—'interest,' 'sentiment,' and 'complex.' 'Interest' is the most comprehensive term, and includes the others. When certain objects or certain lines of action have a special appeal for an individual, we speak of the individual as having an *interest* in such objects or lines of action. Instincts may thus be regarded as congenital interests, and many other interests are acquired during life. Where the appeal is of such a kind as to involve emotional excitement, the term 'sentiment' becomes applicable, but sentiment is obviously a species under interest. In some cases, however, antagonistic impulses are evoked in connexion with the same object or idea, with a confused emotional excitement, which is always disagreeable because of the conflict of impulses. We then speak of a 'complex,' which is thus a sub-species under 'sentiment.'

The phenomena associated with the existence of a complex are of great importance in the early development of the child—and also later; all the more because they are apt to be imperfectly understood, and the imperfect understanding to lead to erroneous treatment of the child, which as often as not leaves permanent results behind it. The way in which the complex arises is simple enough, but the ways in which it affects behaviour are often far from simple. A child, acting under the influence of some quite natural impulse, meets a painful check of some kind. The pain—it need not be physical pain and in the more serious cases is not—will tend to evoke the impulse to escape along with fear. The original impulse, however, remains, and whenever the same kind of situation presents itself, or even the thought of that situation, the child has at one

and the same time the impulse to act as before, and an impulse to inhibit such action. That is to say, two mutually incompatible impulses are experienced at the same time. The conflict itself may be so intensely disagreeable as to produce what the psychoanalysts call 'repression,' with consequences which it is impossible to foresee. In any case, we may expect a complex to come into existence.

The complex most frequently encountered in children is that known as the 'inferiority complex.' One of the present authors has elsewhere described the phenomena as follows: The complex "is established when the child's positive self-impulse, the impulse to seek recognition, to seek to be regarded as of some importance, meets with constant and painful checks and disappointments. In the first instance a painful feeling of inferiority in some respects or in all is experienced. If this persists, and is not relieved by success or encouragement, the complex comes into existence. The results of its establishment vary with the individual, with the conditions determining its establishment, and with the intensity of the emotions and the strength of the impulses involved. These results are nearly always to be regarded as serious. There may be a paralysing lack of self-confidence in the child, even in the less serious cases, or a spirit of resentment and hostility directed against things in general. In the more serious cases the outcome is usually grave delinquency or mental abnormality. The reaction of some children is in the direction of finding some compensation for inferiority in one respect by developing some special cápacity, and so attaining superiority in another respect. Occasionally, therefore, the final outcome may be a distinct gain to society at large, though seldom even in this case without

much suffering to the individual. Too often, however, compensation is sought in the world of phantasy, rather than in the world of reality."[1]

It is often asserted that the main lines of a child's character and personality are laid down in the earliest years of life, and before his school life beings. There may be some little exaggeration in this, but it is certain that the moulding influences of early childhood leave enduring results. It is for this reason that we have discussed at such length the instinctive equipment and the chief characteristics of the emotional development of the child. Not till he enters the period of adolescence, if even then, will the child pass through a period so critical for the happiness and efficiency of his after-life as in his pre-school years.

Other aspects of a child's development during the pre-school period are also important. The older child study and the more systematic child psychology of recent years have accumulated a great mass of observations concerning the child's acquisition of language, the widening of his experience and his horizon, the development of his thought processes, all of which are now recognized as practically valuable by the educator and the enlightened parent. The more important of these observations we must now consider.

Let us take the child's language first. The normal age at which a child begins to speak is round about eighteen months. Sounds are, of course, made long before this, and sounds that have some resemblance to words used by the adult and other members of the family. Moreover, these sounds may be associated with quite specific objects or situations, so that, when the child utters them, they appear quite appropriate to the circumstances, and the

[1] Drever and Drummond: *Psychology of the Pre-school Child*, p. 40.

child seems to be using words, that is, speaking. Hence mothers and nurses often date the first speech of the child weeks or even months before he is really speaking. It must be remembered that the making of a specific sound in a specific situation is not using language. Various birds, notably the parrot, can be taught to do this with facility and apparent aptness. We have certain evidence that the child is speaking only when the sounds uttered clearly perform the psychological function of language. This function the psychologist describes in technical terms by saying that language is an instrument of conceptual analysis and synthesis. This means in untechnical terms that language is an instrument by means of the words of which we separate out the parts or aspects of a concrete situation, and then by putting the words together in a certain order build up the situation again in our own minds or in the mind of another person. In effect, this implies that the unit of language is the sentence, not the word. It also implies that, until we have evidence that the child is using word-sounds as parts of a sentence, however rudimentary, we cannot be sure that the child has any language.

Many studies have been made of the vocabulary possessed by children at different stages in their early development. The methods employed to record vocabularies have varied to such an extent that the conclusions of different investigators are not always directly comparable with one another. We do know, however, that the vocabulary of the young child is much more extensive than was at one time supposed, and that the ordinary child on entering school at the age of 5 may be possessed of a stock of from fifteen hundred to two thousand words. The manner and order in which this stock of words is acquired

vary to some extent with the environment and experience of the child, but certain general principles may be laid down. To begin with, the child acquires the names of familiar objects in the environment, together with a few verbs expressive of everyday acts. Then there is a period during which the nouns are relatively stationary, while the number of verbs increases rapidly. Then again the number of verbs remains relatively stationary, while the nouns increase rapidly once more. Each of these phases represents an obvious stage in the development of the child's experience. The other parts of speech represent rather development in the mentality of the child himself. Adjectives are acquired earlier and more rapidly than adverbs, because they express qualities which are more easily grasped—are, as it were, more concrete. For the same reason prepositions are acquired earlier than subordinating conjunctions, since they express more concrete relations. Certain words are specially indicative of important stages in the development of thought. Such are the first personal pronoun 'I,' with 'if,' 'because,' 'perhaps,' etc.

The acquisition of a vocabulary on the part of the child is partly motived by the mere pleasure of playing with sounds, which possibly gratifies the child's self-impulse. He takes a pleasure and a pride in his own accomplishment. It is also bound up, however, with the developing thought-world of the child, words becoming a necessity, as it were, of the child's mental life. Only in recent years has anything beyond a merely superficial knowledge of this mental life been made available. Part of the credit for recent progress in our knowledge of what goes on in the child's mind must be assigned to Freud and the psychoanalysts. Some credit also is due to opponents

and critics of psychoanalytic views. There has, in fact, been a great stimulation of interest in child psychology within the last two decades, and the result has been a deeper, fuller, and wider knowledge of the motives, the content, and the limits of the child's thinking.

It is somewhat futile to attempt to fix a period at which the child may be said to begin to *think*, more particularly if the word 'think' is left undefined. If by 'thinking' we mean conceptual thinking—the thinking of relations—then we can say that the child has already made some progress in this when he begins to speak. If the word is used in a more general sense to signify all mental activity, the child may be said to think from birth, if not before. His thinking, however, is undoubtedly marked by different stages, which can to a certain extent be distinguished from one another. From the beginning the child is set the problem of shaping and organizing his world of experience. The first stage of this process is learning to distinguish between himself and the world in which he lives. This very important step is not taken all at once. The sense of a real world outside and independent of himself is impressed upon him by conditions and limitations imposed on his actions—conditions and limitations to which he must adjust himself. He finds that he cannot move his arms and legs freely because of obstacles which prevent movement in certain directions; he cannot continue to watch the flight of a butterfly or a bird unless he moves his eyes and his head so as to keep the butterfly or the bird in his field of vision. And so the tale goes on. From such experiences gradually arises the distinction between Self and what is not Self, and that sense of an independently existing reality which is the foundation of belief.

It must not be imagined that the child has the same emphatic sense of reality and unreality which is characteristic of the adult. That develops only gradually. During the pre-school period at least reality and unreality are by no means sharply marked off from one another in the child's mind. If parents remembered this they would have fewer heartburnings over the 'lies' told by their children. The same is true with respect to the distinction between the living and the not-living. This is a distinction in the external real world which arises early in the mind of the child because of the difference between the behaviour of the two kinds of 'things' in his real world. But although the distinction arises early, it is very inadequately drawn until much later. The truth is the real world in which the young child lives is different from the real world of the adult in many important respects. It is a world in which nursery rhymes and fairy tales might be true, and their happenings not even very unusual.

Recent writers of the psychoanalytic and allied schools make much of the distinction between reality thinking and what they call 'autistic' thinking. Reality thinking is thinking directed towards the solving of real problems and the meeting of real situations in the real world, the conditions of the real world being always kept in mind. Autistic thinking is thinking directed towards the obtaining of pleasure through the satisfaction of natural impulses without taking any account of the conditions of real existence, as in phantasy or day-dreaming. In the young child's thinking the two are inextricably interwoven with one another. Before the sense of reality arises, all the child's thinking, such as it is, may be said to be autistic. When the child begins to feel the pressure of real condi-

tions, he has already, as it were, developed resources within himself, by his autistic thinking, which make him able in some cases to have what he wants without taking account of real conditions at all. In other words, he can by his imagination bring into existence for himself what he wishes. It is little wonder, then, that the real and the unreal are by no means sharply marked off from one another.

We shall have more to say about the development of phantasy or day-dreaming presently. In the meantime we may cite as an illustration of the intermingling of reality thinking and autistic thinking in the pre-school child a well-marked phase of the development of his speech. This is the phase where he carries on long conversations with himself. He may interject a remark or a question addressed to another person—child or adult—but not waiting for an answer he goes on as if he had already supplied the answer for himself, obviously wrapped up in what he himself is saying, and not in the least interested in those others to whom he is addressing these interjected remarks.

This long and rather general discussion of the phenomena of child development during the pre-school period was necessary in order to enable us to understand many things which happen later in the child's mental life. There is a growing conviction among child psychologists that the main lines of a child's character and personality are laid down during these early years, and that nothing that happens to him in later years is comparable in importance, as far as his development is concerned, with what has happened to him before ever he comes to school. The psychoanalysts especially press this point. Possibly, as we have already said, they exaggerate it, but neverthe-

less the importance of these early years must be clearly recognized, and from some points of view can hardly be exaggerated.

II. LATER CHILDHOOD

As the child enters on his first great adventure when he begins his life in the world, so he enters on his second when he begins his school life. Going to school means meeting a larger world than the child has hitherto met. The way in which he will react towards the new and wider life will depend on a variety of circumstances—the manner in which he has been treated at home, the attitude of the home towards the school, the extent to which he has already come into contact with other children, his own disposition and temperament, and his earliest impressions of the school life itself. Coming from a home where he has been made a great deal of, especially if he is an only child, he may find adjustment to school life very difficult. Too little attention has in the past been given to the very real fear which the sensitive child, brought up in a sheltered environment, may experience on beginning school, and the lasting effect this fear may have on his subsequent career in the school and in after-life. Without question, this is a very critical time in the life of every child, and seeds may be sown which will bear very unexpected and possibly undesirable fruit later.

We have already had occasion to mention autistic thinking. The usual form taken by autistic thinking is day-dreaming or phantasy, in which the individual gratifies in imagination the impulses and wishes which the conditions of real life obstruct or deny. With considerable individual variation there are definite types of day-dream, which correspond with a fair degree of constancy

to the different stages of development. Thus the imaginary playmate type of day-dream is characteristically that of the young child, the adventure type of the older child, and the romantic type of the adolescent. All such day-dreams might be called ' compensation ' day-dreams. Their function is to compensate for the felt lack of means and opportunities in the environment or in the conditions of real life for the satisfaction of natural impulses and needs. Kept within limits, such day-dreams can do little harm. There is, however, another kind of autistic thinking, which not infrequently also takes the form of day-dreaming or phantasy, but which may also take other forms. In this case the motive behind the autistic thinking is the avoidance of some disagreeable situation which requires to be faced, and we therefore speak of it as a 'flight from reality,' or if it takes the form of a day-dream as an ' escape day-dream.' This kind of autistic thinking is always dangerous and may be disastrous.

The ' flight from reality ' occurs most frequently on the eve of critical changes in life. Beginning school is one of the critical periods at which it may occur. The form the ' flight from reality ' usually takes at this stage is some disturbance of behaviour, rather than day-dreaming, though day-dreaming is also frequently involved. The result is a ' problem child.' The child may be sullen or rebellious, secretive or timid, a bully or a cry-baby, and later may develop some serious form of delinquency, such as stealing. Physical illness may even be utilized, and in extreme cases developed, as a means of escape.

The beginning of school life is also the time at which that troublesome disorder of speech known as stammering or stuttering most frequently makes its appearance. Too little is at present known of this very common, and to the

sufferer very embarrassing and even painful, disturbance of the language function. It very often shows itself temporarily and in a mild form when the child is first learning to speak. Normally it soon disappears at this stage. When it recurs with the beginning of school life it must be regarded very seriously, since if allowed to develop it will probably handicap the child severely throughout his school life, and may prejudicially affect his whole career.

Stuttering differs from other speech disorders, such as aphasia or defective articulation, in that it is intermittent in character, and in that there is no physiological cause to explain its presence. It seems incorrect to describe it as a disorder of speech, for at times the stutterer can speak in a perfectly normal manner without hesitation of any kind.

At first stuttering was thought of as being organic in origin, and various surgical operations were performed to effect a cure. A second explanation of stuttering has been along physiological lines, that there is something functionally wrong. It may be faulty breathing, or the wrong position of the tongue and such like. Undoubtedly many cures have been effected by paying attention to these defects, and this is the foundation of many of the speech classes at present in existence. A third explanation has been along psychological lines. Some psychologists have ascribed the cause of stuttering to some hidden complex due probably to an early unpleasant experience now forgotten, some to a feeling of inferiority, others simply to a bad emotional habit.

Undoubtedly the mental factors, whatever these may be, play the dominant part in causing stuttering, although there may be, in addition, other factors of an organic or physiological nature. Stuttering therefore has this per-

sonal side which we do not find in ordinary defects of speech like a lisp. It behoves us, therefore, to treat the stutterer with sympathy and understanding, otherwise undesirable personality and behaviour traits may appear.

One factor which seems to have some connexion with stuttering is the presence of left-handedness. It has been noticed that a number of stutterers are left-handed, and the observation has also been made that stuttering often makes its appearance when a change over is effected from the left hand to the right. Children often begin to stutter when they first go to school, the reason being given that it is then that the change over from left-handedness to right-handedness is forced upon them. Some investigations seem to confirm this connexion between change over from left-handedness to right-handedness and stuttering, while other investigations seem to reveal no connexion of any kind. We must remember, however, that there are different degrees of left-handedness. Some use the left hand for certain actions but not for all. It may be easy for such children to change over wholly to their right hand. With others, the transfer may not be quite so easy, but whether it is the change over that actually causes the speech difficulty to appear, or whether it is the emotional situation composed of reminders and perhaps threats to use the right hand, is not easy to decide. It seems best to err on the safe side, in case the transfer from left- to right-handedness is productive of stuttering, and children who are left-handed should be allowed to remain left-handed.

Stutterers can generally sing without difficulty and also dramatize. It is important to utilize either or both of these in trying to effect a cure. Tenseness is also a characteristic of the stutterer, and various schools of

speech emphasize the importance of this trait. Their treatment consists of teaching the child to relax by means of a series of graded exercises. Satisfactory cures have been claimed for this method. With stutterers, the chief aim should be to avoid any situation which will add to their distress or embarrassment. Stutterers tend to withdraw into themselves, to shun others, and to lead a solitary existence. Any activity which will help them to become one of a group or which will prevent them from feeling isolated will be beneficial.

At the psychological clinic in Edinburgh, a number of stutterers have been examined. The majority show the same characteristics, such as nervousness, tenseness, sensitiveness, shyness, feelings of inferiority, feeling different from others, desire to avoid speech situations. In school the child may shelter behind his stutter, and so become educationally retarded, as a girl of 15 nearly did. It began in her case with feeling too shy to answer in case of ridicule; then as the teacher avoided her, she soon felt that there was no need to answer. Or the child may play truant to escape from the distressing situation of the classroom, and so delinquency begins. Other problems involving the emotional life of the child may arise in the actual work of the school at all stages.

In a succeeding chapter we shall see how great a range there is in the intelligence of children. In school work what one child finds easy may present the most formidable difficulties to another. To expect all the children in a class to go at the same pace is quite absurd. For the more intelligent, the work may not sufficiently engage their energies; for the less intelligent, it may be beyond their powers. In either case behaviour problems may arise. The bright children get into mischief because

they have not enough to do, and what they have to do cannot hold their interest and attention. The dull children lag farther and farther behind their class. If the retardation involved merely the intellectual side of the retarded child, it would be a relatively unimportant matter. Unfortunately this is rarely the case. His inability to do the work done by his classmates cannot but impress the child with a feeling of inferiority. The natural result will be that he will cease to care about his school work, and will, as a rule, seek compensation in some other field of activity, in which he is able to assert his equality with, if not his superiority over, those who beat him so easily in school work. When no such field of legitimate activity presents itself, he may seek compensation in illegitimate activities, such as deliberate breach of school regulations in a kind of bravado, or truancy, or some form of delinquency.

Similar difficulties and problems may arise without any serious inferiority in general intelligence where one or other of the school subjects presents special difficulties because of some special disability in the child. The subject in which this happens most frequently is arithmetic, but in reading it is by no means a rare occurrence, and also in writing and spelling. Where the special disability is serious, unless special measures are taken to deal with it, we may expect the same kind of results as in the case of inferior general intelligence.

To advise concerning the various child problems arising in this and other ways, the institution usually designated the 'Child Guidance Clinic,' but sometimes simply the 'Psychological Clinic,' has come into existence in this and other countries. This must be regarded as one of the most interesting and important developments of

applied psychology in recent years, and one of the most valuable social services which the psychologist is in a position to render. The Institute for Juvenile Research at Chicago, formerly under the direction of Dr. William Healy, now in charge of the work under the Judge Baker Foundation in Boston, has served to a greater or less extent as the model for all such clinics. Dr. Healy's book *The Individual Delinquent* may well be regarded as an epoch-making work. The keynote of the teaching of the book is that the problem of juvenile delinquency is always essentially an individual problem. The Psychological or Child Guidance Clinic is the practical expression of this principle, and at the same time an extension of this principle to child problems other than the problem of delinquency.

The complete organization of such clinics should always make provision for the services of a psychologist, a psychiatrist, a medical man or woman with special experience in children's diseases, and a sufficient number of specially trained social workers to carry out the necessary investigations into home and environmental conditions. The general procedure in these clinics consists in a physical examination, a mental examination, including the giving of intelligence tests both verbal and performance, together with emotional and temperamental tests, an inquiry into social conditions and home environment, family and personal history, school record, and, in brief, into all circumstances bearing in any way upon the problem. In some cases actual treatment may be undertaken in the clinic, and for this purpose no part of the equipment of the clinic is of more importance than the play-room; in other cases recommendations as to treatment are given, and the child is kept in touch with the clinic so that

progress may be recorded. For further discussion of clinics see Chapter XI.

On the intellectual side, the development of the thinking of the child during the primary school period—approximately from 6 to 12—shows several very interesting features. The most fruitful method of study is that adopted by Piaget [1] and his co-workers in recent years. This consists in a study of the child's questions and definitions, and of his use in speech, either spontaneous or under test conditions, of various conjunctions, particularly 'because,' 'therefore,' 'although,' and the like. The child's questions, of course, start at a very early age, and the progressive development of his thought is clearly indicated by the changes both in the content or object of the questions and in the form the questions take. During the early years of school life a child's 'why's' are specially illuminating. Piaget classifies 'why's' into three groups—the 'why' of causal explanation, the 'why' of psychological motivation, and the 'why' of logical justification. This order represents a passage from the more concrete or realistic in thought to the more abstract or formal, and it is on the whole the order in which the 'why's' of the child make their appearance. The child of 7 to 9 rarely seeks a logical justification. His 'why' represents almost invariably the quest for the causal explanation of some occurrence, or the motive of some action, the two being at first more or less equivalent to one another, and a lamentably inadequate explanation from an adult's point of view being quite satisfactory to the child. The 'why' of logical justification does not appear to any marked extent until one

[1] Piaget: *The Language and Thought of the Child,* and *The Judgment and Reasoning of the Child.*

or two years later. That these facts are significant of real stages in the development of the child's thought is confirmed by a study of his use of conjunctions like 'because' and 'although,' and the meaning he attaches to them. There can be no doubt indeed that the child before 11 or 12 has no facility in formal or abstract thinking. This is not so much because he is incapable of such thinking as because he has no interest in it. His problems do not lie that way. Other investigators working with tests of the Binet type or with free association have arrived at similar conclusions.

During these same years the child's vocabulary is increasing rapidly. Terman, on the basis of investigations of the vocabularies of children of different ages, considers that the normal extent of the vocabulary at different ages is represented as follows:

TABLE 2

Age	No. of Words
8	3,600
10	5,400
12	7,200
14	9,000
Average adult (16)	11,700
Superior adult (18)	13,500

An important characteristic of the period from 8 or 9 to 11 or 12 is best expressed by the word 'stability.' The child has come to be quite at home in his world, thoroughly adjusted to his environment, and in normal circumstances takes his enjoyment out of life to the full. The mere pleasure of being active in any way whatsoever will make him endure, and even take pleasure in, tasks that would later appear pure drudgery. For this reason the period has always been recognized as the most favourable period

for rote learning, and was at one time indefensibly exploited in our schools for the committing to memory of various things which were supposed to be available later as a precious possession when the child came to years of discretion, although quite unintelligible at the time they were learned.

Towards the end of the primary school period the stirrings of the second transition period begin to make themselves felt. Up to now the child, and particularly the boy, has been a thorough individualist. About 11 or 12 he begins to show distinct signs of social development. Team games come to have a new meaning for him. Previously they had merely presented opportunities for showing his own prowess. That attitude still survives, and indeed a new impulse towards it is felt in early adolescence, but it is qualified by a feeling, which might be described as the beginning of social feeling, of membership of the team. The gang also tends to come into existence at this time, and carries over into adolescence. Since the lure of adventure is also strong, we may expect, and we actually find, a sudden increase in juvenile delinquency at 11 or 12 and in the early teens.[1]

III. ADOLESCENCE

The years from 12 to 20—the teens—represent in English-speaking peoples the period generally recognized as adolescence; that is, the period during which the sexual functions are established and attain maturity. This has always been considered one of the most important formative periods in the development of the human being. Formerly it was regarded as the most important of all. Recently, as we have seen, there has been a tendency to look on it as second in importance to the pre-school years.

[1] See chapter on "Modern Trends in Child Psychology," *The Study of Society*. Edited by Bartlett, Ginsberg, Lindberg and Thouless.

However that may be, adolescence is a period of many-sided growth, both physical and mental, and a period during which very profound changes in the personality take place. It must not be supposed that adolescence is ushered in by a sudden change amounting almost to a revolution such as some popular writers have described. The change is, in fact, a very gradual one. Nevertheless, quite apart from the definite physical signs in the case of girls, the attentive observer can note the change without difficulty. Its chief characteristic on the mental side is an expansion and redirection of interest, accompanied usually by a greater or less degree of emotional disturbance arising from the development in the boy or the girl of a new kind of self-consciousness. A recent writer records[1] a very interesting and typical case of this self-consciousness of the adolescent. This was the case of a boy of 14 who took to going about on tiptoe all the time. Sympathetic questioning brought out the fact that he did this in order not to make too much noise "with such beastly large shoes," as he put it. The proverbial awkwardness and gawkiness of the adolescent boy or girl is only in part due to the relative lack of co-ordination produced by rapid physical growth. It is due also in part to that adolescent self-consciousness, which becomes conscious of this awkwardness, and by attempts to be inconspicuous, accentuates it.

The main changes taking place at adolescence may be classified under the two heads of physical and mental respectively. Under the first head would come the fairly sudden accession of growth that occurs, and the more important glandular changes resulting from the development of the sex functions. On the mental side, with

[1] Hollingworth: *Psychology of the Adolescent.*

which we are more particularly concerned, there is (1) the attainment of the maximum development of intelligence as tested by intelligence tests, and (2) the expansion and redirection of interest with that new orientation of thought and imagination which is so specially characteristic of the period.

The finding that the intelligence tested by intelligence tests apparently ceases to develop about the middle of the teens has met with great resistance. The adult, perhaps naturally, refuses to believe that he is not more intelligent now than he was at 15 or 16. Nevertheless, whatever may be the explanation, it is certain that this finding follows inexorably from the results obtained by intelligence testing. The Binet Scale really terminates at 15. A group of five tests is added, but these have been found too difficult for the average adult, and merely fix an arbitrary and too high standard. The age scale in the Stanford Revision does not go beyond 14. Two groups of tests are added, for 'average adult' and for 'superior adult' respectively, and in calculating the Intelligence Quotient for adults, 16 is taken as the chronological age, an age which most investigators have found to be too high. Ballard, believing that the finding was due to the difficulty of devising suitable tests for the higher ages, devised his 'absurdities test' with a view to getting a test in which one might expect to find improvement after 16. His results, in spite of the fact that his adult subjects were selected subjects, confirmed the previous finding. Students in the training colleges were found to do no better than pupils of 16 in the secondary schools. The American Army Tests showed an average mental level corresponding to an age of 12½ for the million and a half recruits tested. Many workers have come to the conclusion that

14 is probably a fairer denominator to take than 16 in estimating the Intelligence Quotient of an adult. The plain fact seems to be that there is a basal mental development which terminates normally between 14 and 16, and that the apparent advantage of the adult as regards intelligence is due to the organization of interests, the increase of knowledge, and the facility arising from the acquisition of various skills and dexterities.

The most important phenomena of adolescence, however, are those of the emotional life. These phenomena are for the most part the accompaniments and results of the awakening sex life. This must be frankly recognized. At the same time it is not necessary to jump to the conclusion that all the abnormalities of behaviour that may appear during adolescence are directly due to abnormalities of sexual development. Some are, but some are not.

Before considering the emotional life of the adolescent, we must return once more to the phenomena of the emotional complex. We have already seen that a complex comes into existence when one and the same object, situation, or line of action evokes incompatible emotions and impulses, that it always involves mental conflict, and that this is always so disagreeable to the individual that he cannot help consciously or unconsciously using various devices to escape the conflict. Psychoanalysts take the view that the device usually adopted is repression ; that is, the thrusting of the idea of the object, situation, or action, with the conflicting impulses, out of the conscious life altogether—into 'the unconscious'—and by these psychologists practically the only complexes recognized are repressed complexes. This view, however, is not in accordance with the facts of normal mental life, and necessarily involves a distorted estimate of character and per-

sonality. What is true is that the complex is never accepted by the Self, but the rejection may not, and for the most part does not, involve repression. There are, in fact, all degrees of acuteness of conflict and all degrees of rejection from the slight feeling of shame or fear in connexion with an interest we more or less recognize as belonging to us, to repression which is so complete that all manifestations of the complex are unconscious. The reaction of the individual to the disagreeableness involved will take one of two directions. It will either be a defensive reaction, or it will be of the nature of flight or escape, as that has already been described. In either event a variety of abnormal phenomena may appear in extreme cases. These will be considered in a subsequent chapter. For the present we must rest content with the consideration of broad features.

It cannot be too often repeated that no new instinctive impulses appear at adolescence. There is merely an alteration in the relative prominence and relative strength of existing instinctive impulses, together with a change in the direction of those associated with sex. The impulses which become prominent, in addition to the sex impulses, are the social impulses, usually spoken of rather uncritically as the gregarious instinct and the self impulses. As one would expect, the instinctive impulses most frequently conditioning complex formation in the adolescent are the sex impulses, while the self impulses are usually the other and incompatible impulses involved. Among the most serious of such complexes are those arising out of bad sex habits, which may have been established in earlier years. The problems arising in connexion with bad sex habits are always very difficult to deal with. There has been in recent years a considerable change in opinion regarding

the real nature of the harm done in this instance. Physical harm is not now considered to be so serious as the mental harm. This arises from the sense of guilt and the resulting emotional disturbances; that is to say, from the emotional complex that is thus established. Prevention is much better, and easier, than cure. The sources of the evil may sometimes be traced back to early years, when irritation of the sex organs has been produced by unsuitable clothing, it may be, or by some easily removable condition. That of course should be guarded against. Where children are brought much together, as in boarding schools, careful supervision must be exercised, and hygienic conditions observed as regards sleeping arrangements. Information and advice may also be serviceable if given tactfully and at the right time. It is already a great gain that parents and teachers should be awake to the dangers.

While the problem of bad sex habits is probably more common with boys than with girls, another kind of problem not infrequently arises with girls with the establishment of the sex functions. There is a craving for sweets, dainty food, and the like, which may lead to delinquency in the form of more or less impulsive stealing. Such delinquency must always be treated tactfully and sympathetically. In passing, it might be remarked that as regards the general treatment of girls at menstruation periods, no unnecessary fuss is called for. Violent and prolonged physical exercise should of course be avoided, and it is highly desirable that a female instructress should be in charge of the gymnastics and games of adolescent girls. It has been shown, however, that there is no functional periodicity as regards ability to do mental tests or general school work.

With respect to the general method of dealing with the sex impulses at adolescence, in order to avoid the various dangers there is agreement among educators and psychologists. There ought to be ample provision of activities in which the adolescent can be got to interest himself or herself. These activities should be vigorous and engrossing, and ought to include in a prominent position physical exercises and games. Such activities are really substitute activities. They need have nothing sexual about them, but they, as it were, drain off the energy of the sex impulses. Psychoanalysts speak of this process as *sublimation*.

Another source of difficulty that often makes itself evident at adolescence is the phenomenon usually designated *fixation* among present-day psychologists. Fixation may be briefly defined as the tying up, as it were, of interest, so as to prevent normal expansion and development. All complexes involve some fixation in this sense, and fixation in turn inevitably results in the formation of complexes. A very common form of fixation shows itself in a reluctance to face the wider life opening out before the adolescent. Dr. Leta Hollingworth in a recent book, to which reference has already been made, has employed the striking phrase ' psychological weaning ' for the process of getting away from subordination to the family and becoming an independent person. It is obvious that this is a necessary phase of development, and that normally it is passed through gradually during the period of adolescence. The habits and attitudes which are appropriate to childhood gradually give place to those which are essential for the adult. The superseding of childhood's habits and attitudes, however, is frequently accomplished with difficulty, and in the end imperfectly, partly because of conditions that have been set up during childhood, and partly be-

cause parents, especially mothers, tend to resist it in various ways. One form of fixation then, and probably the commonest, is due to imperfect psychological weaning.

Here are some examples taken from Dr. Hollingworth's book.[1] A boy of 3½ years is found still 'nursing his bottle,' because, according to his mother, he finds it difficult to drink from a cup. "He cried when the bottle was taken from him, so they gave it back to him again." Another boy of 5 years goes into a fit of yelling if his mother goes out, leaving him at home, so that she has to slip out secretly by the back door on the rare occasions on which she must go out without him. In both these cases there is fixation, and the seeds of serious trouble at adolescence are already sown. Here is a striking example from the other end of life. An old lady died recently at the age of 113, and left behind her three bachelor sons with whom she had lived, aged respectively 81, 74, and 70. They said they had never married "because they did not wish to leave their mother." At the time of her death the youngest, aged 70, was still called 'the baby,' and did the housework.

Adolescence is the period when fixation phenomena are specially apt to be exhibited. Here is a more or less typical, if extreme, case. A boy of 19 is brought to a psychological clinic because of the fact that his education is being seriously interfered with by what may be called 'home-sickness.' The history disclosed is as follows: He had done well at the ordinary elementary school in his home town. At the age of 14 he was sent away from home to a secondary school in a distant town, with a view to being prepared for the university. At this school he stayed for only two weeks. During this time he was

[1] *Op. cit.* p. 65.

always weeping, could not eat, could not study, and was continually begging to be sent home. His mother insisted—against his father's judgment—that he should be brought home, and he was accordingly sent to a secondary school in his home town. When he finished the course there, the same situation presented itself. He was then 18. To go to the university he had to be sent away from home. As before, he was miserable, made no friends, could not study, lost rapidly in weight, and had to be sent home again before the Christmas holidays. At home he was again coddled by his mother, who thought that he was physically unfit for a university education. The family doctor was called in, but his verdict was that the boy's physical condition was quite normal. At this point the father thought it advisable to bring the boy to the psychological clinic.

The general phenomena associated with this 'unweaned condition' when the adolescent goes out into the world can be foretold without much difficulty. He will expect special consideration from everybody with whom he comes into contact, and particularly from those in authority over him, as his teachers or employers. These will be expected to act like his parents; that is, like very indulgent parents. If such special consideration is not forthcoming he will react childishly to the situation, going into a pet or a temper tantrum, and developing the idea that he is an ill-treated and persecuted individual. When he comes to the marrying stage all sorts of difficulties may arise, owing either to his inability to cut himself off from his family, or to his expecting his wife to treat him in the same way as his mother has hitherto done. To anyone who realizes the circumstances the nature of the situation will be clear. Emotional dis-

turbances are almost inevitable. Such emotional disturbances may involve the 'flight from reality' once more. The individual is afraid to face the duties, responsibilities, and sacrifices lying ahead, afraid to form new ties or to meet new conditions. In consequence, he refuses to go forward. He desires to remain as he is, not to develop new interests, form new friendships, or undertake new duties. Other causes may produce, or help in producing, this result in the adolescent—the vague dread of growing up, which many adolescents experience, or a feeling of inadequacy or inferiority, developed out of failures or defects in the life at home or in school, which has been excessively brought home to the individual himself. As a result the individual, like Peter Pan, refuses to grow up, and as often as not finds an avenue of escape in phantasies, which may in time come to replace reality. He may even regress, that is, go back to an earlier phase of development, becoming in certain respects more childish, as in his interests, his manner, his dress, his amusements, or his speech.

Temperamental differences, though existing previously, are also apt to become accentuated at adolescence. Much attention has recently been given to the study of two opposing temperamental tendencies, which are now generally designated *introversion* and *extraversion* respectively. It is certain that individuals differ markedly from one another, according as their interest is occupied mainly by things outside themselves or by their own inner mental life. The term 'extravert' is employed to designate the former; the term 'introvert' to designate the latter. The pure extravert and the pure introvert are of course extreme deviations in the one direction or the other, and the great majority of people are inter-

mediate and approximately half-way between the two extremes. At the same time, most individuals tend towards one or the other of the two directions, and in few can they be said to be exactly equally balanced.

The interest of the introvert is predominantly in the subjective world, and there may be some degree of shrinking from the objective world of men and things. If the introversion is very marked, the individual tends to be paralysed in his actions by self-criticism, to live more or less apart, to be absorbed in himself. He is not much interested, as a rule, in physical activities, but rather in things intellectual. He has little respect for facts, being ready even to force facts into harmony with his own ideal constructions or his own philosophy. Exaggerated introversion is apt to lead the individual to exaltation of himself, so that he believes that no one else is worthy of consideration. As a consequence introverts are not likely to exert much personal influence, and are seldom or never good teachers. McDougall seeks to explain introversion as due to an unusual degree of inhibition exercised by the higher over the lower mental functions. This would only partly explain the phenomena. It is true that thought appears to flourish at the expense of emotion, but there may, nevertheless, be strong emotions that do not find outward expression, because the individual does not, as it were, let himself go. In all such cases there is the likelihood of the life of phantasy being over-developed, and this is frequently accompanied by excessive self-consciousness and morbid introspection.

On the other hand, the extravert is free from excessive inner inhibition—sometimes from even reasonable inhibition. His feelings and emotions find free expression in action. As a rule, he is not much interested in the

inner life, but only in objective facts. At the same time he may be very sensitive to the opinions of other people, and is frequently highly suggestible. He is apt to become somewhat materialistic in his outlook. He also characteristically forms opinions and acts without sufficient deliberation.

This is, as we have suggested, a description of two extremes, towards one or the other of which most people show a tendency however slight. The difference is dependent in the first instance on innate differences between individuals, but it is also largely affected by environmental influences in the home and the school. At adolescence we should ordinarily expect a general tendency towards extraversion. We find on the contrary introversion very frequently taking place, and this is certainly the side from which danger must be expected. The best way to meet this danger is by the encouragement of games and social intercourse. This is in some respects the very heart of the adolescent problem, especially with girls.

A fruitful cause of emotional disturbance during later adolescence is religion. It is a well-known fact that the majority of cases of 'religious conversion' occur at this time. Statistical evidence cited by Starbuck [1] is conclusive on this point. Now, conversion is itself very frequently a highly emotional experience, and this is perhaps more especially the case with the conversions of adolescence. At all events, the number of conversions occurring between 12 and 25, according to Starbuck's statistics, can be taken as an indication of the extent to which emotional disturbances associated with religion are taking place. Religion is not instinctive in the

[1] *The Psychology of Religion*, pp. 28–48.

human being; it is acquired. It is emotional as well as intellectual, and religious development cannot be understood by considering either aspect separately, to the neglect of the other. The chief essential in dealing with the emotional disturbances involved is a sympathetic understanding of the nature of the situation. Adolescent doubt is a more or less normal phase in the religious development of the individual. As far as the doubt is merely intellectual, guidance may be given, but never dogmatically. If deep emotional factors are also involved, it is obvious that anything savouring of dogmatism is likely to do more harm than good.

There cannot be any doubt that religious feeling begins in the feelings of children towards their parents. God is at first merely a projection of the child's idea of his father. The qualities attributed to God are those of the father, and the emotional attitude towards God is an extension, as it were, of the attitude towards the father. Even when the child has got beyond this phase of religious development intellectually, the emotional attitude remains more or less the same, and may colour the child's whole religious development to manhood and beyond. The savage never gets away from his idea of his god as a man—a great chief perhaps of former days. With advance in civilization and development of knowledge, the concrete human character of God becomes more and more idealized, but always under the influence of the child's attitude to the father, and emphasizing the qualities and attributes the father once seemed to the child to possess. All this is deeper than the intellect—rooted in the deepest feelings and emotions.

Finally, there can be no possible doubt that sex emotions and religious emotions are closely related to one another

in adolescence. Religion is one main direction taken by substitute activities, one main type of sublimation, more especially with girls. This further complicates the situation, and emphasizes the necessity for the most careful handling of the religious development of the adolescent.

CHAPTER IV

THE MEASUREMENT OF INTELLIGENCE

THE earliest investigations into the possibility of measuring intelligence belong to the second half of the nineteenth century. Sir Francis Galton in his *Hereditary Genius*, published in 1869, describes the construction of a scale for the classification of men according to their natural gifts, the scale being based on "the very curious theoretical law of 'deviation from the average.'" This scale is of undoubted interest historically, for it shows that Galton, even at this early stage in the history of mental testing, had clearly grasped the conception of the continuity of intelligence between the very low-grade intelligence, as represented by the idiot, on the one hand, and the very high-grade intelligence, as represented by the genius, on the other. His scale was divided into sixteen equal steps, these two classes representing the extremes. "Hence," he writes, "we arrive at the undeniable, but unexpected, conclusion that eminently gifted men are raised as much above mediocrity as idiots are depressed below it; a fact that is calculated to considerably enlarge our ideas of the enormous differences of intellectual gifts between man and man." [1]

In a later work, *Enquiries into Human Faculty*, 1883, Galton describes a number of tests, and in discussing these, notes that the more intellectual men have greater sensory acuity and finer discrimination. An attempt, in fact, is made to compare intelligence and achievement in

[1] P. 32.

laboratory tests, of course on very general lines. This exploratory work of Galton was in date almost coincident with similar experimentation by Cattell and others in America. Cattell, in 1890,[1] published a series of tests suitable for the testing of characteristic differences in individuals. These were mainly tests for measuring acuity of sensation, or rapidity of movement, but also included a test for immediate memory. The pioneer work of Galton on the one hand, and of Cattell on the other, may be claimed as the first attempts at measuring individual characteristics, and the first seed from which have sprung all the later developments.

The early history of the movement, however, for the practical measurement of intelligence is closely linked with the name of the French investigator, Binet, the gradual development of whose conceptions, with improvement in the technique of the tests, culminated ultimately in the formation of his well-known scale for the measurement of intelligence.

Binet's earliest attempt in this direction seems to be recorded in an article in *L'Année Psychologique* in 1895.[2] The tests indicated there differ slightly in character from any others in use up to that time. One is a test of ability to memorize a geometrical design; a second tests the ability to memorize a short paragraph; a third tests immediate memory for numbers; a fourth test attempts to measure suggestibility; other tests are measures of æsthetic judgment and of attention. That Binet had some idea of the ultimate practical application of these tests even at an early date is evidenced by the fact that

[1] *Mind*—"Mental Tests and Measurements."

[2] Binet and Henri: "La Psychologie individuelle," *L'Année Psychologique*, 1895, pp. 411–65.

four years later[1] he gave to a number of children tests devised to measure attention and adaptation. Six of the lowest and five of the highest of a class of thirty-two children were selected in order that he might compare the two groups and so discover which tests would be of service in differentiating the bright from the dull. The methods used are not the refined methods of the present-day investigator, but they show quite clearly whither Binet's researches were leading him.

In 1904 a practical problem was presented to Binet, when he was given the task of selecting the most backward children in the schools of Paris, so that they might be given special instruction. He had accordingly to distinguish between the normal child and the backward child, but not as to whether there was a difference in memory, or in imagination, or in insensibility to touch. He had to differentiate between the children according to their whole intellectual endowment, and to decide whether a particular child was backward generally, compared with the average child of his age. Binet, therefore, had to discard the use of tests which only tested specific functions, and had to try to devise a group of tests which would adequately cover the characteristic elements which go to make up what is called intelligence. Binet was assisted in this by a number of questionnaires already drawn up by other investigators for diagnostic purposes. The best questionnaire of the time, according to Binet, was devised by two medical practitioners, Dr. Blin and his pupil, Dr. Damaye. The questions centred round twenty different topics, and included questions about personal habits, speech, ideas of age, knowledge of parts of the body, and

[1] Binet: "Attention et adaptation," *L'Année Psychologique*, 1899, pp. 248–404.

ideas of time. They also tested the individual's efficiency in reading, writing, arithmetic, and drawing. Binet, while aware of the superiority of this list over any others in existence, was also conscious of its defects. Some of the questions appeared superfluous, some too erudite: in some the answers merely required a 'yes' or a 'no,' and left the examiner open to doubt as to whether the child really understood what was asked of him. The choice of topics also appeared to Binet to be too arbitrary, and the total marks given to the child as a result of the examination could not be easily interpreted. A child who scored seventy was undoubtedly better than one who only scored thirty-six, but the examiner was unable to obtain any precise notion of the mental level of either, since he had no standards for purposes of comparison.

Binet, accordingly, in 1905[1] produced a "measuring scale of intelligence," based not on theoretical considerations, but on the results of long investigations, first at the Salpêtrière, and afterwards in the primary schools of Paris. The short questions which it contained were given the name of 'tests.' The aim was to make all the tests "simple, rapid, convenient, precise, and heterogeneous." Binet defined intelligence, in his article descriptive of the scale, as "judgment, otherwise called good sense, practical sense, initiative, the faculty of adapting oneself to circumstances. To judge well, to comprehend well, to reason well, these are the essential activities of intelligence."[2] All tests, therefore, were disregarded which

[1] Binet and Simon: "Méthodes nouvelles pour le diagnostic du niveau intellectuel des anormaux," *L'Année Psychologique*, 1905, pp 191–244.

[2] Binet and Simon: *The Development of Intelligence in Children*, pp. 42–3. Translated by Kite. Published by the Training School at Vineland, New Jersey.

might measure the degree of education the individual possessed; also tests having verbal, literary, or scholastic character were rejected. Further, all tests measuring acuity of sensation, hitherto, figuring prominently in investigations of individual differences, were discarded, because they only gave insight into the sensibility of the subject, and afforded no information regarding his judgment or common sense.

The scale constructed by Binet at this time consisted of thirty tests arranged roughly in order of increasing difficulty. The first few were simple tests, which could be administered to quite young children. The first test, a visual co-ordination test, tests the ability of the child to follow with the eye the movement of a lighted match. Test 2 is a test of prehension provoked by a tactile stimulus, in which the child's ability to grasp a small wooden cube, placed in contact with the hand, is recorded. In test 6 the child is asked to execute simple orders. In test 11 the child's ability to memorize three digits heard only once is tested. Test 18 is a memory test, in which the child is asked to draw simple designs after seeing them for a very brief time. Test 30, the most difficult of all, is a test of ability to distinguish between abstract terms of kindred meaning, such as liking and respecting.

These examples show the graded nature of the scale. Apart from the classification of tests into age groups, which, we shall see, is the main characteristic of the later Binet-Simon scales, this scale has all the essential features of similar tests of to-day. The scale, as a whole, is used for measuring; the tests are simple and require little or no apparatus; they indicate ability or capacity, and they are intended to be independent of educational attainments.

To obtain his standards, Binet worked with very small numbers to begin with. His first estimates were based on the results of testing only ten children from a 'maternal' school, and fifteen from a primary school. Later he added to his numbers considerably. He found from his investigations that tests 1 to 7 could be passed by children from 3 years upwards, tests 8 to 12 by children from 7 upwards, and so on.

In addition to obtaining these standards for normal children, Binet repeated the tests with backward and defective children. He felt that a method whereby teachers could distinguish normal children from backward children would be invaluable to them, and further if a classification could be made within the defective group itself, such a classification would be of great assistance to physicians. On the basis of his results, he accordingly classified defective children with a fair degree of precision into three groups—the idiots, the imbeciles, and the feeble-minded, according to the number of tests they could pass in his scale. An idiot, even at his highest mental development, could pass the first six tests and no more. An imbecile could pass the tests 7 to 15, and feeble-mindedness of different degrees was indicated by the range of tests from 16 up to the point of normal intelligence.

At this stage Binet recognized that chronological age and intellectual age must both be taken into account. For instance, Binet records the case of a child of 12 whose performance on the tests is equal to that of a child of 2, and who in consequence is ten years retarded. Another child, who is only aged 4, has the same degree of intelligence, but is therefore only two years retarded. He agreed that such a difference must be taken into considera-

tion, but how this was to be achieved was not yet apparent. A first step, however, was made with the more elaborate scale which appeared in 1908.[1] This contained a number of new tests. The striking advance in this scale over the previous one lies in the fact that the tests are all allocated to particular ages. That is, the tests are arranged in age groups, corresponding to the attainments of normal children from age 3 to age 13. To some of the age groups, three tests only are allocated, whereas to others we find as many as eight. Illustrations from two of the age groups will serve to represent the entire scale.

Age 3.

Test 1. Ability to point to nose, eyes, and mouth.

2. Repetition of sentences. The child is expected at this age to repeat six syllables. "It rains. I am hungry."

3. Repetition of figures. The child ought to be able to repeat two figures after hearing them once, such as 3, 7, or 6, 4.

4. Enumeration of several objects in a picture.

5. Knowledge of family name.

Age 6.

Test 1. Ability to distinguish right and left.

2. Repetition of sentences, this time of sixteen syllables.

3. Æsthetic comparison. Six drawings of heads of women are presented in pairs. One of each pair is pretty, the other ugly, and the child has to point each time to the prettier one.

4. Definition of familiar objects such as fork, table, chair. A child at 6 passes this test if he defines the objects with regard to their use. "A fork is to eat with."

5. Execution of three simultaneous commissions. "Do you see this key? You are to put it on the chair over there,

[1] Binet and Simon: "Le Développement de l'intelligence chez les enfants." *L'Année Psychologique*, 1908, pp. 1–90.

afterwards shut the door; afterwards you will see near the door a box which is on a chair. You will take that box and bring it to me. Now, first the key on the chair, then shut the door, and then bring me the box."

6. Ability to distinguish between morning and afternoon.

In applying this scale, there is no need to test the child with the scale as a whole, as in the 1905 series. All that is necessary, and this holds for all similar scales, is to begin with some age group at which the child can pass all the tests, and to continue giving one test after another in order until the child's limit is reached. For every five tests passed beyond the age group at which all the tests can be passed one year is added, the total giving the child's mental age. Binet—and Simon who was then collaborating with him—was still conscious of the difficulty in combining chronological age with mental age. He repeats that although a child of tender years tests out low on the scale, and may be classified in a certain category because of his low mental age, yet increase in years may show improvement in intellectual level, with a consequent need for reclassification. Much further research, Binet feels, is required on the point before the many problems of this nature can be elucidated. It was, in fact, left to later investigators to develop this idea and to devise a method which would take into account both chronological and mental ages.

The appearance of the 1908 scale led to its try-out in various countries by different investigators. Among others, Decroly and Degand[1] tested a number of Belgian

[1] Decroly and Degand: "La Mésure de l'intelligence chez les enfants normaux d'aprés des tests de Binet et Simon." *Archives de Psychologie*, 1909, pp. 81–108.

children; Bobertag[1] a number of German children; Goddard[2] a number of American children, and Johnston[3] a number of English children. The main conclusions reached as a result of these investigations were that the tests were too easy at the lower end of the scale and too difficult at the upper end. The results of these and other criticisms and recommendations led Binet and Simon to revise their 1908 scale, and the scale appeared in a revised and final form in 1911.[4] The main feature of this new scale is the attempt to make uniform the number of tests in each age group. Some tests suggested as being too difficult were removed to older age groups, others too easy were transposed to younger age groups. New tests also were added. Otherwise the scale remained substantially the same. For the calculation of mental age, Binet now advocated that each test, beyond the age group at which the child can pass all the tests, should be reckoned as a fifth of a year. This removed certain anomalies in the previous methods of calculation.

The scales devised by Binet and Simon are rarely used nowadays in their original form, but are gradually being replaced by better revisions and new scales. It was undoubtedly the genius of Binet, however, which made at all possible the measurement of intelligence.

[1] Bobertag: "A. Binets Arbeiten über die intellectuelle Entwicklung des Schulkindes (1894–1909)," *Zeitschrift für Angewandte Psychologie*, Vol. III, pp. 230–59. See also articles in Vol. V and Vol. VI.

[2] Goddard: "Four Hundred Feeble-minded Children classified by the Binet Method," *Pedagogical Seminary*, 1910, vol. xvii, pp. 387–97.

[3] Johnston: *British Association Report*, 1910, also *Journal of Experimental Pedagogy*, Vol. I, pp. 24–31, 148–151.

[4] Binet: "Nouvelles recherches sur la mésure du niveau intellectuel chez les enfants d'école," *L'Année Psychologique*, 1911, pp. 145–201.

REVISIONS OF THE BINET-SIMON SCALE

The earliest revision of the Binet-Simon Scale was that of Goddard, who tested out the scale at the Training School for Feeble-minded Children at Vineland. Starting with the 1908 scale, he tried to adapt the tests to American conditions, but with as little modification as possible. His standardization of the tests was based on the results obtained from applying it to 2,000 children. The Vineland revision of the scale was used almost exclusively for detecting feeble-minded children, and was given to every child entering the Institution, of which Goddard was the Director, as part of the routine procedure. It was only very gradually that prejudice broke down against applying it to normal children.

Before long Goddard's scale, which was extensively used over the U.S.A., was superseded by a more elaborate revision, and one which has remained the chief revision of the scale to this day. Terman, of Stanford University, California, with many collaborators, worked out very carefully a revision of the Binet-Simon Scale. He utilized fifty-four tests from this scale, but added thirty-six new tests, twenty-seven of these devised by himself, the others adapted from other investigators. The Stanford Revision was most carefully standardized. For purposes of standardization, it was given to about 1,000 children, and to about 400 adults. Terman was not satisfied with his revision until he had rescored and readjusted the tests three times. His guiding principle throughout was " to secure an arrangement of the tests and a standard of scoring which would cause the median mental age of the unselected children of each age group to coincide with the median

chronological age. That is, a correct scale must cause the *average* child of 5 years to test exactly at 5, the *average* child at 6 to test exactly at 6, etc." [1]

Terman's scale tests children from the age of 3 to the age of 14. In addition, there is a group of tests which can be passed by the average adult whether schooled or unschooled, and a second group which tests those adults who are superior in intelligence. Terman, in addition to standardizing the results from his scale, also standardized the technique of administering and scoring the tests. For each test minute instructions are available, and these must be rigidly adhered to if the testing is to possess any validity. Specimen answers are also given for each test, so that the scoring has been made as objective as possible. To give the Stanford Revision to any child—and this applies to any intelligence test—is no light task. Careful study and a grasp of principles are required before any stress can be laid on the results obtained.[2]

Binet, as we have already noted, tried to discover a method of linking up chronological age with mental age, but was not successful. William Stern seems to have been the first to suggest a method, by dividing the mental age obtained by the child's chronological age. The result he termed the mental quotient. Thus a child of 10 whose mental age was assessed as 10 would have a mental quotient of 1. A child of 10 with a mental age of 12 would have a mental quotient of 1·2, whereas a child of 10 whose mental age was only 8 would have a mental quotient of ·8. Terman adopted this method from Stern, but substituted for mental quotient the term intelligence

[1] *The Measurement of Intelligence*, p. 53.

[2] Since this was written there has been a further revision by Terman—the Terman-Merrill Revision.

quotient, or I.Q., and expressed the quotients as whole numbers by multiplying them by 100. The three quotients already quoted would accordingly be 100, 120, and 80 respectively. The I.Q. may therefore, from another point of view, be taken as representing the percentage of average intelligence.

The I.Q. is a measure which apparently remains fairly constant throughout an individual's life. The child at 10 with an I.Q. of 120 will still have an I.Q. of 120 at ages 12 or 14 or 16. His mental age has increased as has his chronological age, but the ratio between the two has remained constant. This, in effect, holds fairly true, although, as in everything else, exceptions occur. From an analysis of the 1,000 cases of children examined, Terman was able to ascertain the frequency of the differing degrees of intelligence. For example, he found that the lowest 1 per cent. have I.Q.s of 70 or below, whereas the highest 1 per cent. have I.Q.s which reach 130 or above. The lowest 2 per cent. have I.Q.s of 73 or below, the highest 2 per cent. reach 128 or above, and so on. He also drew up the following descriptive table at the same time, laying emphasis on the fact that the boundary lines between any two groups are not rigid, but indeed are very arbitrary.

TABLE 3

I.Q.	Classification.
Above 140	'Near' genius or genius.
120–140	Very superior intelligence.
110–120	Superior intelligence.
90–110	Normal or average intelligence.
80–90	Dullness, rarely classifiable as feeble-mindedness.
70–80	Border-line deficiency, sometimes classifiable as dullness, often as feeble-mindedness.
Below 70	Definite feeble-mindedness.

(See also pages 177 and 273.)

A revision of the scale similar to that of Terman is that carried out by Cyril Burt for English children.[1] He started with the 1911 Binet series, and with the co-operation of Simon, translated the tests into terms suitable for English children. The norms are based on the testing of over 3,000 London children. As a result, the placing of the tests has been considerably adjusted, but the tests themselves adhere very closely to those of the Binet-Simon Scale.

One other revision of the Binet-Simon Scale may be mentioned, because it contains features different from those already discussed, and in practice it has been found of great service in testing older children from 11 upwards. The revision referred to is the Herring Revision.[2] The tests of this revision, thirty-eight in all, are contained in a small book which comprises the whole outfit necessary for the examiner. The tests are divided into five groups, and the mental age can be obtained by using any one group. Group A contains tests 1–4, and if a hurried diagnosis is required, Group A will give an approximate mental age. If more time is at one's disposal, and if a more accurate diagnosis is essential, Group B, tests 1–13, is used. A yet more exact diagnosis would entail the use of Group C, tests 1–22, or Group D, tests 1–31, or Group E which comprises the complete scale, tests 1–38. Although the scale is, in essence, based on the Binet Scale, the tests used in the scale are totally different from those of the original scale. In the picture test, for example, the child's response is scored, as in the Binet test, on the basis of its being

[1] *Mental and Scholastic Tests. Vide* also *Report of the Mental Deficiency Committee*, 1929.

[2] *Herring Revision of the Binet-Simon Tests, Examination Manual*, Form A.

on the enumerative, descriptive, or interpretative level, but the pictures used are different from the well-known Binet pictures, and so also with most of the other tests.

PERFORMANCE TESTS

The Binet tests, and modifications of the Binet tests, are linguistic tests; that is, they are dependent on the use of language, both in giving the test and in responding to the test. Some investigators maintain that intelligence tests of the linguistic type are more influenced by schooling than is at all desirable. Burt, in fact, estimates that one-half of the total result obtained with the Binet Scale is attributable to school attainment. Very striking evidence of this was obtained by Gordon [1] in a study of gipsy and canal-boat children. He tested 82 gipsy children and 76 canal-boat children by means of the Stanford Revision of the Binet Scale. These children, in respect to health, morality, etc., are equal to town dwellers, but their intellectual life is meagre, owing to their lack of education, and also owing to their social isolation. When the canal-boat children were tested, 36 children were found to have on the average a mental ratio of 71, and the average mental ratio of the remaining 40 was only 67. The younger children, however—children under 6—were found to possess a mental ratio of 90–100. In some cases the younger children were found to be more intelligent than older children even in the same family. Similar results were obtained with the gipsy children. Apart from the results of the tests, there was no other reason for assuming feeble-mindedness. The obvious explanation was lack of schooling. Their estimated average attendance worked out at about 4 or 5 per cent., whereas the

[1] *Board of Education Reports*, 1923.

average attendance of children in elementary schools in England is about 88 per cent. Further, the reason why the younger children did better in the Binet tests is that the tests for the early years do not depend to the same extent on schooling.

For the testing of the non-verbal or concrete type of intelligence, it is essential that we have appropriate tests, if not as a substitute for the linguistic tests, at least as a supplement to them. Such tests are known as performance tests. Performance tests can consequently be defined as short mental problems, which may be presented and must be solved in non-verbal terms—that is to say, the child is asked to *do* something rather than to *say* something. These tests must not be confused with tests of manual dexterity, in which success depends primarily on skill and deftness of the fingers, nor must they be confused with tests of mechanical ability in which recognition of mechanical relationships is necessary for success.

Performance tests have had as long a history as the more familiar Binet test. Their development, however, has been much slower. Two reasons may be adduced. In the first place, such tests, unlike the Binet tests, require a great amount of material, which has the effect of making the testing expensive and laborious. In the second place, it has been found a matter of great difficulty to devise tests for older children—children above the ages of 8 or 9. The earliest of such tests were form-boards, where the individual was required to place insets into their respective places, a triangle into a triangular-shaped depression, a circle into a circular-shaped depression, a square into a square-shaped depression. These were first devised by Itard for training mental defectives. He was followed about 1846 by his pupil Seguin, who devised a number of

form-boards specifically for those retarded in mental development. They were first used as performance tests, that is as tests of intelligence, in 1906, by Norsworthy,[1] who employed one of Seguin's form-boards in testing a group of mentally defective children. Performance tests, nowadays, contain many types of test besides those we call form-boards. But though the actual tests vary, the principle on which they are built up remains constant. They are essentially concrete tests which the child can understand and pass without the use of language, thus making them suitable for use in the case of all those who do not comprehend spoken language or who are unable to hear the spoken word.

Because of the nature of performance tests, then, they can be utilized where ordinary intelligence tests are not suitable. Illiterates or foreigners, to whom a linguistic test offers special difficulties, get a fairer test of intelligence when a performance test is given. Children with physical abnormality such as a speech defect or deafness can be more satisfactorily assessed by performance tests than by linguistic ones. A performance test is especially essential when any diagnosis of mental deficiency has to be made. If the child is to be certified as defective "within the meaning of the Act"—that is, as unable to profit by ordinary school education—then as the school curriculum is heavily weighted on the linguistic side, it would seem that a linguistic test would be better. But many children would score better on a performance test than on a linguistic test, and in consequence would be capable of schooling if that schooling were more suited to their needs, and more attention given to the concrete aspect.

[1] "The Psychology of Mentally Defective Children," *Archives of Psychology*, 1906.

Whenever, therefore, there is any question of labelling a child *mentally defective*, both linguistic and performance tests should be applied.

Although the performance test is of exceptional value in these special cases, it must not be forgotten that it can to some extent be used as a substitute for the Binet Scale with ordinary children. The correspondence between results from the Binet Scale and from performance tests has been found to be close enough to warrant the substitution of the one for the other, as well as the supplementing of the finding of the one by the finding of the other.

The best-known scale of performance tests is the Pintner-Paterson Scale, which was devised in 1923.[1] This scale consists of fifteen tests; some of them are adapted from Healy and Fernald who had devised a group of tests to aid in the diagnosis of the mentality of the foreign child and the child with language difficulties; some of them are adapted from Knox, who was faced with the testing of non-English-speaking immigrants at Ellis Island; and some are original. The series was originally drawn up because of difficulties encountered in the testing of the deaf child, and the tests were so constructed that no instructions were required beyond those that could be made by natural gestures.

Of the fifteen tests finally selected, seven are pure form-board tests, two others are of the same general character, three are picture-completion tests, and the other three are a memory-span test, a learning test, and a test of orientation. Form-boards are therefore, to a very marked extent, predominant in this scale, a rather unfortunate characteristic, since there can be no doubt that chance can play a very large part in the successful performance of many

[1] Pintner and Paterson: *A Scale of Performance Tests.*

form-board tests. The attempt to minimize the influence of chance has involved elaborate and complicated methods of scoring.

A second series of performance tests is that drawn up under the auspices of the Industrial Fatigue Research Board in 1925 by Gaw.[1] This series is more varied in character than the scale just described, and the predominance of the form-board has been somewhat reduced. The tests were tried out in English schools, and English norms are available. The series contains fourteen tests, comprising some from the Pintner and Paterson Scale (1917), some from the U.S. Army Scale of Performance Tests (1920), and in addition Maze tests devised by Porteus in 1919.

A third scale of performance tests was devised in 1925 by Drever and Collins.[2] This scale was originally devised in response to an invitation from the Governors of the Royal Institution for Deaf Children in Edinburgh for guidance in assessing the mentality of the deaf for teaching purposes. The investigation begun in Edinburgh soon extended to deaf children in Scotland and England, until over 1,500 children were tested ranging in age from 4 to 16. In addition a number of hearing children, whose intelligence had already been assessed by a linguistic scale, were given the performance scale, and the results compared. Norms are in consequence available for both hearing and deaf children. This scale consists of twelve tests, only two of which are form-boards. As these only score 12 out of a total score of 148, it will be seen that their influence has been reduced to a

[1] Report No. 31.

[2] *Performance Tests of Intelligence.* Book of instructions and norms, published by Oliver and Boyd.

minimum. A further advantage of this scale is the simplicity of its scoring.

A later scale of performance tests is that devised by Arthur in 1930.[1] It consists of two series considered to be of equal value and difficulty. The first series was standardized on 1,100 school-children; the second series, which is intended for use as a retest, on 535 of the same children tested a year later. No new tests appear in this scale, but those used have been very carefully and very completely standardized.

These scales just described all contain varied types of tests. There are other scales in which a graduated series of tests of the one type is available. The Porteus Maze Test is one of the best known. It has been found of value, not only in assessing intelligence, but in giving indications of temperamental qualities as well. A second series is Kohs' Block Design Tests (1923), in which coloured blocks are used to build up designs which gradually become more difficult and complicated. Another, Kent's Series of Geometrical Puzzles (1916), was designed to test both children and adults, as was Ferguson's Graduated Series of Form-boards (1920), while Alexander (1930) has devised a series of tests of a type more or less similar to a form-board—the Passalong Test. In this last there are nine tests arranged in a graded series. The first is suitable for a child of 6 or 7, the ninth will give trouble to the average adult.[2]

[1] *A Point Scale of Performance Tests.* New York: The Commonwealth Fund Division of Publications.

[2] *British Journal of Psychology,* vol. xxiii, pp. 52–63.

GROUP TESTS

The tests of intelligence discussed up to the present are tests which must be given to only one individual at a time, and this type of test is employed when a particular diagnosis is required. But where a large number of individuals have to be tested, as in the survey of Scottish children (1932), in which 90,000 children were tested, the time consumed in individual testing becomes a serious consideration. The group test is therefore always substituted.

A great impetus was given to group testing by the American Army tests, which were given to nearly two million men during the Great War. These tests were drawn up by a committee of leading American psychologists, including Yerkes, Goddard, Terman, and Whipple, and based on material already collected by Otis, Pintner, and others. The object of the tests was to select men of sufficient ability to be placed in posts of responsibility, and, at the same time, to eliminate men of too inferior mentality to be worth training. The tests could be administered in about fifty minutes, and groups as large as 500 could be tested simultaneously. As all the individual testing of intelligence has been based on the Binet Scale, so all the group testing of intelligence has been based for the most part on the American Army tests.

There are certain characteristics of the American Army Scale which are characteristic of the majority of group scales. One characteristic is that each separate test in the scale is graded in order of difficulty, so that everyone can do so much of the test, no matter how poor the intelligence. Also, there is a time limit to each test, usually

so fixed that only 5 per cent. or less in any average group will be able to finish the entire series in the time allowed. The time limit is the point against which the most serious criticism of group tests has been directed. The validity of this criticism has been investigated by Spearman and others, and recently by Sutherland,[1] who, after extensive experiments, concluded that a time limit made practically no difference in an estimate of intelligence.

Another characteristic of the American Army tests is that directions for each test are printed on the test sheets and are read aloud by the examiner, the testees following the reading on their booklets. Samples of the tests with answers always precede the tests themselves. These give the examinees sufficient practice in the type of test, and ensure that they are not impeded by doubt as to the correct procedure. In addition, there is almost a complete elimination of writing, the examinees having to underline or cross out on the pages of the booklet itself, so that slow writers do not suffer any disadvantage.

Finally, the tests are easily and objectively scored. The answers are made by marking on the question paper itself, as already noted, and can be corrected by means of a stencil. The stencil consists of a transparent sheet which exactly fits the page of the booklet, and has on the appropriate places marks indicating the correct answers. By superimposing the stencil on the page all errors are immediately detected.

Two forms of the Army tests were drawn up, known as the Alpha and the Beta Tests respectively. The Alpha tests are for those able to read and write English; the Beta tests are for illiterates and foreigners, and are as far as possible a translation of the Alpha tests into pictorial

[1] *British Journal of Psychology*, vol. xxiv, pp. 276–94.

form. Eight forms of each test were devised to prevent coaching.

Illustrations of the eight tests of one of the forms of the Alpha Army Test with the preceding sample tests are given below. The first and last items of each individual test is given. The instructions printed on each test sheet have been omitted.

Test 1. *Following Directions.*

1. Attention. Look at the circles. When I say 'go,' but not before, make a cross in the first circle, and also a figure 1 in the third circle. (Five seconds allowed.)

12. 1 2 3 4 5 6 7 8 9

Attention. Look at 12. If 7 is more than 5, then when I say 'go,' cross out the number 6 unless 6 is more than 8, in which case draw a line under the number 7. (Ten seconds allowed.)

Test 2. *Arithmetical Problems.*

Samples:

1. How many are 5 men and 10 men? Answer (15).
2. If you walk 4 miles an hour for 3 hours, how far do you walk? Answer (12).

1. How many are 60 guns and 5 guns? Answer ( ).

20. A commission house which had already supplied 1,897 barrels of apples to a cantonment delivered the remainder of its stock to 37 mess halls. Of this remainder each mess hall received 54 barrels. What was the total number of barrels supplied? Answer ( ).

Test 3. *Practical Judgment.*

Sample:

Why do we use stoves? Because:

( ) They look well.
(x) They keep us warm.
( ) They are black.

1. It is wiser to put some money aside and not spend it all, so that you may:
   ( ) Prepare for old age or sickness.
   ( ) Collect all the different kinds of money.
   ( ) Gamble when you wish.

16. Why should we have Congressmen? Because:
   ( ) The people must be ruled.
   ( ) It ensures truly representative government.
   ( ) The people are too many to meet and make their laws.

Test 4. *Synonym—Antonym.*

Samples:

Good—bad . . . . . same—opposite
Little—small . . . . . same—opposite

1. No—yes . . . . . same—opposite
40. Abstruse—recondite . . . same—opposite

Test 5. *Disarranged Sentences.*

Samples:

A eats cow grass . . . . . true—false
Horses feathers have all . . . . . true—false

1. Oranges yellow are . . . . true—false
24. Begin a and apple acorn ant words with the true—false

Test 6. *Number Series.*

Samples:

2	4	6	8	10	12	14	16
9	8	7	6	5	4	3	2
2	2	3	3	4	4	5	5
1	7	2	7	3	7	4	7

3	4	5	6	7	8	....	....
3	6	8	16	18	36	....	....

Test 7. *Analogies.*

Samples:

Sky—blue : : grass—table green warm big.
Fish—swims : : man—paper time walks girl.
Day—night : : white—red black clear pure.

1. Shoe—foot : : hat—kitten head knife penny.
40. Wound—pain : : health—sickness disease exhilaration doctor.

Test 8. *General Information.*

Samples:

People hear with the eyes ears nose mouth.

France is in Europe Asia Africa Australia.

1. The apple grows on a shrub vine bush tree.

40. An irregular four-sided figure is called a scholium triangle trapezium pentagon.

A great variety of group tests is in existence. Most of them are very similar to the test just described. The National Intelligence Group Test was prepared by the National Research Council, which consisted practically of the same committee as was responsible for the Army tests. The novel feature of this group test is the fore-exercise which precedes each test. The Otis Group Intelligence Test is a group test fairly extensively used. It can be obtained in two forms, the primary form which can be used with very young children, and the advanced form which is suitable for older children. It is drawn up on somewhat similar lines to the American Army tests, in that each test has its own time limit. Other tests are the Kuhlmann-Anderson tests, which are very reliable, and the Group Test No. 33 of the National Institute of Industrial Psychology.

In some group tests, instead of each test being timed separately, a time limit is given to the tests as a whole. The Northumberland Mental Test, devised by Thomson, is of this nature and is a typical 'omnibus' test, the term applied to such an arrangement of test material. Six tests have been employed, but instead of these appearing as six separate tests, they have been divided up and arranged throughout the booklet, appearing, as it were, in regular cycles. This enables the candidate to attempt more than one test, and prevents him from delaying at

one type of test which is perhaps too difficult for him. Richardson's Simplex Test is another example of the omnibus test.

Group tests must be almost as carefully applied as individual tests. The instructions drawn up with each test must be rigidly adhered to with each group of candidates, and the timing of the tests must be very accurately regulated.

PRE-SCHOOL TESTS

An interesting development within recent years has been the devising of tests suitable for pre-school children. The best-known of these, and probably the most valuable, are those of Stutsman (1926), Gesell (1928), and the Minnesota Pre-school Scale (1932).

The Stutsman tests [1] for pre-school children were devised and standardized at the Psychological Laboratory of the Merrill-Palmer School. The norms are based on the testing of 529 children, 252 boys and 277 girls, ranging in age from 18 to 71 months. Twenty-one tests in all have been used. For each test norms are given, and full instructions are available for administering the tests.

One of the tests consists of fitting 16 cubes into a box so that the lid can go on. At 18 months only 35 per cent. of babies place all 16 cubes in the box. At 24 months, 80 per cent. are able to place all 16 cubes in the box, and in a much quicker time. At 30 months, 90 per cent. of children are able to achieve the task.

A second test consists of a nest of 4 hollow cubes which the child has to insert one within the other. The time taken to perform this is the important factor.

A third test is made up of two peg boards A and B of

[1] *Mental Measurement of Pre-school Children.* World Book Company.

the Wallin series, in which the child has to insert pegs into holes. The scores depend again on the time taken.

Other tests are equally varied in character: repeating words and groups of words; answering simple questions; buttoning 1 button, 2 buttons, and 4 buttons; building a pyramid with 3 cubes and then with 6 cubes in imitation of the examiner; the Seguin Form-board; picture puzzles; Woodworth and Wells' Action Agent Association Test, in which the child is asked such questions as —what seeks ? what scratches ? what flies ? what bites ? etc.; the little pink tower test, in which the 5 small blocks of the Montessori pink tower are used; the Mare and Foal test of Pintner and Paterson; the Manikin test of Pintner and Paterson; the Decroly matching game, which consists of placing silhouette pictures of a star, lamp, square, basket, etc., on top of corresponding objects which appear on large cards in sets of 4.

The Gesell tests [1] are unique in character. They deal with stages of normal development from birth to the sixth year. " This period," writes Gesell,[2] " exceeds all other epochs in developmental importance. This period occupies approximately the first 70 months of the scriptural allotment of 70 years—only one clock hour, reckoning the entire span of human life as a day. But during that hour the major portion of the total stream of development flows under the bridge."

To assess development during this early period, Gesell has drawn up, after much careful investigation and experimentation, a series of developmental schedules. As the rate of development is variable at different periods in life, and does not proceed in regular stages from one year

[1] *The Mental Growth of the Pre-school Child.* Macmillan.

[2] *Ibid.*, p. 4.

to another, but is quicker relatively in the earlier stages than in the later, the schedules have not been drawn up at year intervals. The nine schedules begin with one for the neonate, that is, the baby from birth to 1 month. This schedule is descriptive rather than normative. The other schedules are drawn up for (1) 3 to 4 months; (2) 6 months; (3) 9 months; (4) 1 year; (5) 1½ years; (6) 2 years; (6) 3 years; (8) 4 years; (9) 5 to 6 years. Expressed in months, this series progresses as follows—3 : 4 : 6 : 9 : 12 : 18 : 24 : 36 : 48 : 72. They are so ordered that each level makes with the succeeding level a developmental ratio of two-thirds or three-fourths. If any child approximates consistently the developmental level which is one full interval below his normal level, there is a presumption that he is retarded or defective. If the reverse holds, he is advanced for his age.

The fields of behaviour included in these normative developmental schedules are classified into four groups, Motor, Language, Personal-Social, and Adaptive Behaviour. Under the Motor Group are included items which relate to muscular capacity and co-ordination. The Language Group is concerned with vocalization, speech, and auditory comprehension. To the Personal-Social Group are assigned items which largely involve social experience and personality traits. The Adaptive-Behaviour Group involves the general capacity to exploit the environment or to make adjustments to imposed situations. Each item is given a rating in letter values and in months. A + represents a frequency of 1 per cent. to 19 per cent.; A, 20 per cent. to 49 per cent.; B +, 50 per cent. to 64 per cent.; B, 65 per cent. to 84 per cent.; C, 85 per cent. to 100 per cent. Thus the Motor Test, M24, which records if the child can push with his

feet, is given a 4C rating. This means that this item is found at 4 months old in 85 per cent. to 100 per cent. of the cases. A14, the ability to pick up a spoon from a table, is given two ratings, 4A+ and 6C. This means that at 4 months, only 1 per cent. to 19 per cent. of babies perform this, whereas at 6 months it is normally found among 85 per cent. to 100 per cent. of the cases.

The number of items which appear in each schedule is about 35, and these are to be given in a definite order. The final estimate of a child's developmental status is built up not in any mechanical manner by simply adding and classifying the letter ratings, but by a consideration of the number of his successes and failures in reference to the total behaviour picture.

The Minnesota Pre-school Scale[1] has also proved very useful in actual practice. It is partly a verbal and partly a non-verbal scale. In all, there are 26 test items. Some of these are familiar to users of the Binet Scale, such as pointing to parts of the body or to objects in pictures, copying simple drawings, memory span for digits, definition of terms, etc. Others involve block-building, as in the Merrill-Palmer Scale, or tapping cubes in imitation of the examiner, or giving opposites to simple words like cold, bad, dark, etc. In the record form, provision is made for the assessment of personality traits, these to be assessed on the basis of the child's behaviour during the test.

WHAT IS INTELLIGENCE?

So far we have mainly described the chief types of intelligence tests, and have only indicated here and there very briefly some of the results obtained and the problems

[1] *Manual, Form A.* Minneapolis: Educational Test Bureau.

raised. There is one further problem, the discussion of which cannot well be left out.

Since the beginning of the present century a somewhat heated, and not a little confusing, controversy has been going on among psychologists regarding the nature of intelligence. As soon as the claim is put forward that intelligence can be tested, the problem of the nature of intelligence must inevitably arise. It by no means follows, however, that the way to solve the problem is by an examination of the results of intelligence tests themselves. In an American symposium on the nature of intelligence, in which various apparently widely discrepant definitions of the term 'intelligence' were proposed by the various speakers, one of the suggested definitions was, that 'intelligence' is 'what our tests test.' This definition has incurred a good deal of cynical comment and even ridicule. Nevertheless, it seems to be a postulate underlying any attempt to deduce the nature of intelligence from the results of intelligence tests. It is not surprising, therefore, that many psychologists regard a large part of the discussion that has been carried on in this field as a futile war of words and symbols.

The controversy has based itself mainly on the results obtained by calculating the correlation coefficients between the scores obtained by the same group of individuals in different mental tests, or the marks obtained in school and college examinations. The correlation coefficient is an expression in quantitative terms of the extent to which two series of test scores or examination marks are in agreement with one another. Thus, if in two tests A scored 12 in the first and 18 in the second, B 14 in the first and 21 in the second, C 18 in the first and 27 in the second, D 24 in the first and 36 in the second, and so on,

we should have perfect agreement in the two series of test scores, A, B, C, D, etc., occupying precisely the same relative positions, and making precisely the same relative scores in the two tests. The correlation coefficient in this case would be unity, i.e.:

$$r \text{ (the correlation coefficient)} = 1.$$

If these relations were completely reversed, so that the higher an individual's score in one test the lower it was in exact proportion in the other, we should have perfect inverse or negative correlation, i.e. $r = -1$. If the agreement between the two series is not perfect, either positively or negatively, the correlation coefficient will be represented by a decimal fraction, falling between $+1$ and -1, according to the degree and nature of the agreement.

The use made of the correlation coefficient is simply an application of a well-known principle or canon of inductive logic. If two phenomena are found to vary together, we argue that there is some causal relationship between them, that one is the cause or effect of the other, or that both are the effects of a common cause. The correlation coefficient, for the calculation of which mathematicians have supplied us with the necessary formulæ, is a measure of the extent to which there is concomitant variation as regards two phenomena, and it indicates, therefore, the probability that there is some causal relationship between them. In the case of marks or test scores, the correlation coefficient shows the extent to which they are affected by some factor operating on both series. For example, if we get a correlation coefficient of ·6 between the marks obtained in an examination in arithmetic and the marks obtained in an examination in English by the pupils in a school class,

we take ·6 as an indication of the probability that the ability to do the examination in these two subjects involved a common factor or factors.

During the last three decades numerous investigations have been carried out with different kinds of mental test to determine whether the test scores showed any high degree of correlation, and whether they indicated a high probability that the abilities to do the various tests depended on a general factor, which might be identified with what we call 'intelligence.' It might be added that many psychologists appear to have been so hypnotized by the statistical jargon that they have failed to realize the limited extent to which it was possible for such investigations to throw light on the nature of intelligence. A long controversy has raged round the interpretation of the results of these investigations. In this controversy the protagonists have been Thorndike and Spearman. It is impossible here to follow the various lines of argument,[1] but the general conclusions may be briefly summarized. On the basis of the results of his own and other investigations, which appeared to show very little correlation between the scores in different mental tests, Thorndike developed his 'multiple-factor theory.' According to this there is no evidence in mental operations of any single common factor. There is not one 'intelligence,' but many 'intelligences.' From this view Thorndike himself has largely departed in recent years, and he has now joined in the search for a 'unitary' factor or factors. Spearman, on the other hand, has contended from the beginning that the results of all kinds of mental tests support by their correlation the view that there is a single general factor

[1] See Spearman: *Abilities of Man.*

operating in all cognitive processes. Further, he has held that the performance in any mental test is dependent on this general factor, and on a factor specific to the particular mental operation involved. This is Spearman's 'two-factor theory.' The general factor he calls 'g,' and he has all along hesitated to identify it with intelligence, though that has always been the implication.

Spearman's hesitation to identify 'g' with intelligence is easily understood. On the line of reasoning based on correlation coefficients, it is impossible so to identify it. Spearman's views regarding the nature of intelligence are largely independent of his mathematical and statistical analysis of the data obtained from mental tests. They are based directly, as they ought to be, on the examination of intelligent processes themselves. Such examination has led him to the formulation of his three 'noegenetic' laws, which may be taken as his account of the nature of intelligence, and which no mathematical or statistical reasoning could ever have evolved from his correlation coefficients. The three laws are, briefly, the 'law of the apprehension of experience,' the 'law of the eduction of relations,' and the 'law of the eduction of correlates.' It is doubtful whether the first law is more than a general description of what consciousness or experience itself implies. The second and third laws, on the other hand, express what has always been recognized, at least since Lotze, as the essential characteristic of intelligence, viz. relating activity. Why he makes two laws of what is seemingly a simple and unique phenomenon it is difficult to understand.

When we examine the mental life we find that it is characterized always by *consciousness* on the one hand, and *intelligence* on the other. *Consciousness* may be described as

'an inside view of the event'—apparently Spearman's first 'noegenetic' law—*intelligence* as 'insight,' or 'grasp of the relevance of things, actions, or ideas.' Wherever there is consciousness there is intelligence, but in varying degrees. Spearman's 'g' may be taken as a rough quantitative expression of the amount or degree of intelligence manifested in the various mental processes which are involved in mental tests. It can throw little light on the nature of intelligence itself. Spearman himself rather speculatively suggests the identification of 'g' with mental energy.' The specific factor then represents the share in any operation of the particular mental 'engine' which the energy activates. This is too like a recrudescence of the old faculty psychology.

CHAPTER V

PERSONALITY AND CHARACTER

THE TESTING OF TEMPERAMENT

IT must be clearly recognized that the possession of a high intelligence is not necessarily a guarantee of success in life. It is quite common, for example, for a person of high intelligence to be lacking in tact in his relations with others, or to be lacking in drive, whereas another of less intelligence may possess these desirable personal traits. As one writer expresses it, " For all practical purposes of life, social intelligence wins over abstract intelligence, ten to one. Abstract intelligence knows what to do, but social intelligence knows how to get it done." [1] Undoubtedly the possession of the requisite amount of social intelligence, as we may well call it, is an important factor making for success. The recognition of this has led the Department of Psychology at one of the American universities to devise a series of tests designed to measure social intelligence. This was given, in the first instance, to all the students entering that university in 1925 to assist in planning out courses of study and careers. Since then the test has been applied in other universities and also in industrial concerns.[2]

This series consists of six separate items devised to measure different aspects of social intelligence. These include: a test of judgment in social situations, in which the individual is asked to check the correct solution among

[1] Moss: *Applications of Psychology*, p. 213.
[2] *Op. cit.*

four alternatives: (e.g. you have an employee who is very efficient, but he is continually complaining about the work he has to do; you have noticed that his complaints have a bad effect on the other employees; it would be best to:

1. Request the other employees to try to overlook his faults.
2. Find out why he has that attitude, and try to make an adjustment.
3. Change him to some other department where he will have another boss.
4. Let him do most of the planning for his work.)

a test of ability to recognize 12 faces and to associate the correct names with them out of a group of 25, after seeing them for four minutes: a test of ability to link up emotional states with facial expressions: a test to determine the accuracy with which the individual observes the motivations and behaviour of others: a test of social information, in which a number of statements requiring knowledge of politics, science, music, art, travel, etc., have to be assessed as true or false: a test in which the individual has to connect the emotional states of ambition, scorn, love, jealousy, etc., with their appropriate quotations.

A criticism has been directed against this test, and it is probably valid, that it is not so much a measure of social intelligence as of general intelligence. The median scores given by the authors are:

For High School Students	83
For College Freshmen	98
For Upper-class College Students	111
For College Graduates	113

Terman, who gave the test to children of very superior intelligence,[1] obtained as the median for high school senior boys, 113; for high school senior girls, 116; for college freshmen, boys 120, girls 119; and for those out of school over one year, boys 117, and girls 118. These subjects were all of very high intelligence, but as Terman remarks, "We cannot infer that the actual social behaviour of intellectually gifted individuals will be as superior as their scores would suggest," for the test tests knowledge only of how one ought to act, or what one ought to do in various social situations, and is no guarantee that the individual will act in that way.

The assessment of temperament and character has proceeded very slowly because of the difficulty of devising suitable tests. Methods of assessment have been attempted from four different angles.

In the first place, attempts have been made to analyse the personality into its ultimate elements, and then to assess the individual for each element. The result of this method has been that schedules of human traits have been devised. These are helpful in assisting in any examination, since they provide a clear survey of the ground to be covered. One such survey has been made by Webb,[2] in which he has analysed character into various elements. His schedule is divided into four sections, each containing 4 to 9 traits, the total number being 23. The first section deals with the emotions, and we find here such traits as: general tendency to be cheerful, readiness to become angry, and readiness to recover from anger. Under a group headed self-qualities are found such traits as: desire to excel at performances (whether

[1] *Genetic Studies of Genius*, vol. iii, p. 163.

[2] *British Journal of Psychology*. Monograph Supplement Number 3.

of work, play, or otherwise) in which the person has his chief interests, degree in which he makes his influence felt among his fellows, desire to impose his own will on others. The third group is called activities, and includes such traits as: extent of mental work bestowed upon usual studies, extent of mental work bestowed upon pleasures, degree of bodily activity during school hours. Quickness of apprehension, profoundness of apprehension, common sense, and originality of ideas are the four traits included under the fourth group to which has been given the name 'intellect.'

The schedule was drawn up for the examination of schoolboys. Each boy was scored for each trait by two class teachers who had the boys under casual observation for some time. The marks given ranged from +3 to −3. This method of assessing character traits was found to yield very satisfactory results.

A slightly different type of assessment takes the form of a questionnaire. One devised by Allport—A Systematic Questionnaire for the Study of Personality—is for self-analysis. The individual has to answer a number of searching questions on various aspects of his personality. Woodworth also has devised a Personal Data Sheet. This is not so much concerned with the assessing of the traits actually possessed by an individual, as with gaining insight into his inner mental life, and laying bare his difficulties and worries. Each question is so arranged that it permits of the answer 'yes' or 'no.' By giving the test to a large number of persons, the normal replies (whether 'yes' or 'no') are ascertained. Any individual's replies can be compared with the normal, and if there are too many 'wrong' replies, further investigation seems desirable.

The second line of approach to the assessment of temperament shows an interesting departure from the above, in that attempts are made to classify individuals into different categories or types. Rosanoff, for example, has divided personalities into four main types, which he describes as the anti-social, the cyclothymic, the shut-in, and the epileptic, personalities. These types are shown in extreme form in mental hospital cases, but Rosanoff asserts that all these varieties in less degree are to be found among normal people. The anti-social type may show itself in social life in lying and malingering; the cyclothymic individual is very unstable, and is characterized by ups and downs; the shut-in individual is the dreamy, detached, shy person, who is apt to live in a world of fancy; the epileptic personality is violent and headstrong, and given to brief likes and dislikes.

Other personality classifications have been attempted from several different points of view. There is the time-honoured, four-fold classification of temperaments, sanguine, melancholic, choleric, and phlegmatic, or the two types suggested by William James, the obstructed and the explosive. Jung has suggested a more important classification into extravert and introvert, the former seeking contact with reality and with people, the other shunning reality and living in a world apart.[1] It has also been claimed that personality types are determined by the physical 'build' of the individual, marked temperamental characteristics, it is alleged, being associated with certain physical types.[2]

Within recent years a glandular theory of personality differences has been proposed, based on the predominant

[1] See pp. 73 ff.

[2] Kretschmer: *Physique and Character.*

activity of one or other of the ductless or endocrine glands. The secretions of these ductless glands—*hormones*, as they are called—are poured directly into the blood-stream. The chief ductless glands are the thyroid in the neck, the pituitary in the head, the thymus in the thorax, some of the sex glands, and the adrenal glands above the kidneys. The absence or presence of the secretion of these glands seems to involve a marked difference in the personality. The presence of thyroid secretion in excess causes restlessness and heightened emotionality; its deficiency makes the individual inert and languid, and in extreme cases produces the feeble-minded cretin. Other glands have equally important effects on the personality.

These classifications of personality are serviceable in the delineation of character, but are not too useful in practical life. In practical life we all have our own methods of judging character, by general appearance, by conversation, by behaviour, and so on. In this connexion we may cite the prudent mother's advice to her son in the selection of a bride, that he should observe how a woman eats cheese. 'The extravagant one cuts the rind away thick, the miserly one eats the rind, the right one cuts the rind thin and carefully.'

RATING SCALES

The employer of labour has of necessity been compelled to devise some method of estimating another's personality in his task of engaging employees. He receives testimonials, or arranges an interview, or he may employ both methods. The personal interview is undoubtedly the more trustworthy method and the one on which he is usually compelled to fall back. Psychology is endea-

vouring at present to refine the technique of the interview by drawing up schedules of facts to be noted and observed, so that each candidate will be assessed by the same method, thereby making results more comparable. This is partly being accomplished by the drawing up of what are known as rating scales. These scales have taken different forms. In one variety character is measured by relative position. A number of individuals are asked to arrange a given list of individuals in an order of merit, with reference to one particular trait only, such as clumsiness or tidiness or honesty. Then the list is arranged again with reference to some other character trait, and so on. This means, of course, that those being rated are known to the raters.

In another type of rating scale, a key is first prepared, and the individuals are rated from the key. Suppose that a class of children is to be examined. A few will first of all be selected, as good, poor, and average. Then these few will be considered from the point of view of one trait only, say tidiness. Every other characteristic is disregarded. The name of the tidiest child is placed opposite the word *highest* on the key. The list is again considered, and the name of the child most lacking in tidiness is selected and placed opposite the word *lowest* on the key. Then the child between these two as regards tidiness is selected and his name entered opposite the word *average* on the key. These three names might be sufficient to form a key. Other two children if desired can be chosen, one between average and highest, and one between average and lowest, thus giving five steps, 'highest,' 'high,' 'average,' 'low,' 'lowest.' Each child in the class is then compared for tidiness with the three or five children, and ranked with the one he most nearly

resembles. A certain number of points may be allotted to each key position. Similarly, keys may be drawn up for other character traits to be assessed. The best-known rating scale of this nature is the Army Rating Scale of Scott, in which the traits assessed were the traits considered essential for the making of an efficient officer.

The great disadvantage of this type of rating scale is that those who are to draw up the key and do the assessing may not know the individuals intimately enough to be able to do so with any degree of accuracy. Further, if more than one is to draw up the key, it is quite common to find that the raters disagree among themselves as to the placing of those chosen to constitute the scale. One investigator found, in connexion with the Army Rating Scale, that one rater placed an officer highest in the key for a particular trait, whereas another rater placed the same officer lowest in the key for the same trait, showing that people vary considerably in their judgments of others.

Other types of rating scales, therefore, have made their appearance which have dispensed with the necessity of a key and the necessity of man-to-man comparison. These are known as Graphic Rating Scales, in which a graphic basis is used for making the ratings. The different degrees to which a trait may be possessed are indicated by a straight line, and the rater checks the point on the line which he believes to represent the degree to which the individual possesses the trait. Sometimes the words ' very high,' ' high,' ' average,' ' low,' and ' very low ' are written below the line, and a cross is placed above one of these to indicate the degree to which the trait is possessed. In some graphic scales words designating opposite traits are placed at either end of a line, such as ' pessimistic—optimistic,' ' cheerful—depressed,' and the rater marks

some point on this line to represent the individual's position between the two extremes.

After the cross or other mark has been made on the line, the rating is given a numerical value, by measuring the distance of the mark from the end of the line. The line may be divided up into five or into seven units, arranged on a stencil which is placed on the line. Whichever unit contains the cross, gives a numerical value. The values of all the traits assessed in the rating scale are then added, and a total rating is found, which usually has 100 as its upper limit.

A further extension of the rating scale appears in the Adjective-Checking Scale, in which the work of the rater has been simplified still further. In these scales, descriptive adjectives are placed under the line. In one scale, the trait to be assessed is 'industry,' and we find the words 'very energetic,' 'industrious,' 'indifferent,' 'lazy.' Those under the 'ability to learn' are, 'very superior, 'learns with ease,' 'ordinary,' 'slow to learn,' and 'dull.' This method has the advantage that it makes the scoring more objective.

A useful rating scale is that drawn up by the National Institute of Industrial Psychology, to enable the investigators to assess the character of any child who wishes vocational guidance. In drawing up the scale, a list was made of the fundamental instincts and emotions, for these are the foundations of character. Next, a supplementary list was drawn up, containing more complex characteristics of a moral and social nature, such as reliability and industry. Lastly, a rating scale was devised to facilitate measurement in numerical terms. For each quality every child is allotted the mark, A, B, C, D, or E, to indicate the degree to which the trait is

possessed. Plus and minus signs are freely used, so that fifteen units are really employed in this scale. The simpler qualities estimated comprise qualities such as 'fear,' 'anger,' 'curiosity,' 'tenderness,' 'acquisitiveness.' The secondary qualities include such traits as 'self-confidence,' 'initiative,' 'co-operation,' 'honesty,' 'punctuality.' Results from this test show that judgments in well-defined elementary traits like 'timidity' are far more consistent than judgments on the more complex traits like 'honesty' or 'reliability.'

Self-rating scales, in which the individual is asked to assess his own character, have not proved satisfactory. Most people are very bad judges of themselves, and tend to overrate in themselves any desirable qualities, and to underrate in themselves qualities that are not so desirable.

In using rating scales, no matter of what kind, there are certain precautions which ought to be observed.

In devising a rating scale, the first essential is to decide on what traits are to be assessed. The rating scale will be drawn up to serve a purpose of some kind, either to indicate the factors necessary for success in school life, or the traits of character of value in vocational life of different kinds, or the fundamental qualities requisite for an efficient officer, and so on. The traits of importance will vary according to the purpose in hand. Once the qualities to be assessed are selected, these should be clearly defined, so that anyone who is rating will know exactly what any particular trait is intended to represent. The greater the number who can carry out the actual assessing, the more reliable will be the results. If possible, three people at least should assess, and their assessments be averaged. One very important precaution to be noted in rating is the avoidance of the 'halo.' An individual may be brilliant

along one particular line, although relatively poor in other ways. It is sometimes difficult not to allow the brilliance to overshadow everything else, so that the individual is marked high on all traits. The converse holds equally true. Dislike of a person may hide any good points he possesses, and cause low ranking throughout. A concrete example of this occurred with Scott's Army Rating Scale. An officer who was generally disliked was marked low in the rating scale on every trait assessed, even as regards intelligence. Yet this officer had made a very superior score on the American Alpha Test, and had ranked first for intelligence out of 150 officers. The 'halo' surrounding him—it will be noted the halo can operate in both positive and negative directions—had obscured the good qualities he did possess. This phenomenon is not uncommon: it occurs constantly in everyday life.

TEMPERAMENT TESTS

The fourth method of assessing temperamental traits has been the devising of various tests. We shall discuss first of all those tests which have been drawn up to assess the moral character of an individual. One of the earliest tests in this sphere is that devised by Fernald in order to compare the differences between delinquents and non-delinquents. The test consists of ten cards, each of which contains a description of an act which violates the moral code. The individual is asked to arrange these ten cards in order of gravity of offence. The order is said to differ considerably as between delinquents and non-delinquents. There are various forms of this test, pictures or photographic portraits, or descriptions of actions may all be substituted. This type of test is very difficult to score.

Other tests have attempted to measure moral judgment by noting how often a child singles out ethical reasons for certain actions, in preference to reasons of a more personal nature, a test similar in construction to the social intelligence test already described. Kohs' Ethical Discrimination Test is a typical example. It is arranged in booklet form, and is not unlike an intelligence test, but with moral situations substituted. Each of the six tests of which it is composed is scored on a percentage basis, and from their average score can be obtained the moral ages of the individuals examined. On the whole such a test is fairly satisfactory, but it undoubtedly tests intelligence as well. Those who score high in an intelligence test also make a high score on such a moral test. The reverse also holds good. One boy of 17 years (mental age 11), who had been convicted of theft, tested out on this test with a moral age of 8 years 10 months.

An interesting series of tests has been devised by Raubenheimer [1] for delinquent children. Raubenheimer has tried, as far as possible, in devising his tests to present situations which will cause the child to reveal himself, rather than to display his knowledge about moral situations, as in Kohs' Test. He has tried to create a desirable test atmosphere, so that frank responses will be given, and has avoided references to what is acceptable or non-acceptable, good or bad, right or wrong. He has also avoided such questions as 'What's the thing for you to do?' or 'What best explains?' etc., that is, he has avoided the use of any direct moral evaluation. The word 'test' is not printed on the blanks, and in the instructions emphasis is laid on the fact that the blanks to

[1] "Experimental Study of Behaviour Traits," *Psychological Review*, Monograph No. 34.

be filled up are not tests. The following examples will indicate the nature of the series and show how ingenious some of the tests are. In Test 1 an answer is sought to the question to what extent a person gives a false impression of his literary interests. The testee is asked to mark, from a list of fifty books, those books which he has read, no matter how long ago. Twenty fictitious titles appear in the list. The object of the test is to find out how many of these fictitious books are marked, it being thought that such a misstatement on the part of the examinee might be an index of his 'mental honesty.' In another test, twenty book titles are given, which suggest some form of boyhood activity, questionable or otherwise. The examinee is asked to indicate the order in which he would care to read the books. The question here of whether the examinee is a book-lover or not is of no concern.

There is one test which is specially ingenious. It is not originally one of Raubenheimer's, but was suggested by a previous investigator, Voelker, and extended by Raubenheimer. There are really two parts of the test, one in which the examinee has to rate himself on a kind of questionnaire involving knowledge of various facts, and a second which checks up his rating, so that one can see how far he overstates his knowledge and how far he understates it. Below are two examples of this test.

PART 1

Directions:

Here are some more questions like the one you just had. Mark yourself this way.

I know it very well	2 points
I know something about it	1 point
I know nothing at all about it . . .	0

A perfect score is 80 points. We want to see how many of you can get a perfect score. After you finish, we will let you stand up and tell your score.

	Points
1. Do you know who discovered America?	.....
2. Do you know who saved the life of Captain John Smith?	.....
3. Do you know much about the Boy Scouts?	.....
4. Do you know where the pyramids are?.	.....
5. Do you know how to play checkers?	.....

Etc.

PART 2

Directions:

Draw a line under the right answer to each of the questions below as shown in the samples.

Sample 1:

The number of days in a week is 5 6 7 8.

Sample 2:

New York is in England France Spain United States.

1. America was discovered by Drake Columbus Balboa Cook.
2. The Indian girl who saved Captain John Smith was Pocahontas Uncas Hiawatha Minnehaha.
3. A Boy Scout must not eat candy ride horseback chew gum smoke cigarettes.
4. The pyramids are in Arabia Palestine India Egypt.
5. The king-row is used in checkers cards crokinole dominoes croquet.

Etc.

Five of the tests of this scale of Raubenheimer were given by Terman to his gifted children. Two other tests were added, including a trustworthiness test originally devised by Voelker. This test consists of a circle with five small circles at irregular intervals round the circumference. The person tested has to put a cross in each of the circles with the eyes shut, a task which is impossible unless the subject surreptitiously opens the eyes. Similarly, a nest of five squares, decreasing in size, is presented

to the subject, who is asked to trace round with a pencil in between the squares, an equally impossible task with the eyes closed, at least if it is to be done with reasonable accuracy.

Terman obtained a much higher score with his gifted children than with a group of average children, whom he

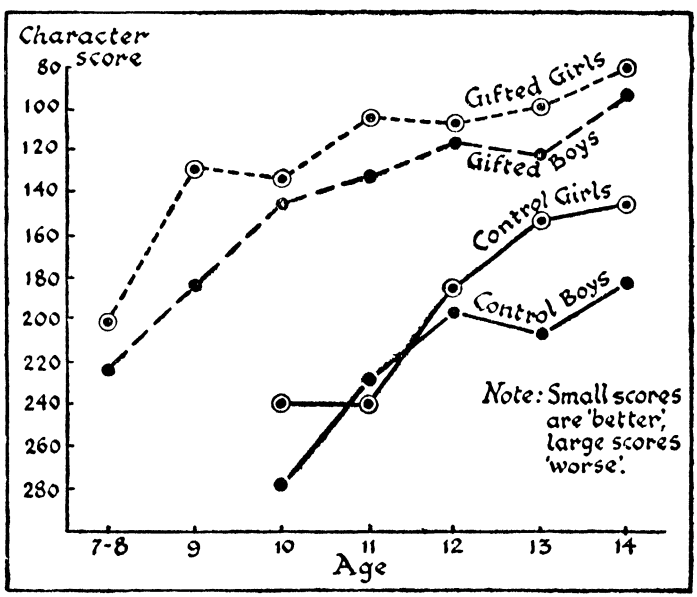

FIG. 3.

used as a control group for purposes of comparison. The results indicated that the gifted child of 9 years is fully as developed in the character traits, measured by these tests, as the average child of 14 years. The results of the seven tests are presented by Terman in the form of graphs or curves, four in all, one for gifted boys, one for gifted girls, one for average boys, and one for average girls (Fig. 3).

These curves show the scores obtained at different ages. This is the most valuable part of Raubenheimer's and Terman's work, in assessing the levels of character for the different ages. The way lies open for the establishment of a 'characterial age' scale analogous to a mental age scale.

TESTS OF EMOTION

Various tests have been suggested for investigating the emotional life of an individual. The Pressey Cross-Out Test is one of the best known. It has two forms, A and B—A specially devised for adults, B for children. The two forms are essentially the same in principle, the only difference being that in Form B are omitted many of the words which occur in Form A. The test has been devised with a definite end in view, namely, to serve as a convenient starting-point in dealing with child delinquents or problem children of any kind, particularly when disorders of the emotions or sentiments may be expected. In the University Psychological Clinic at Edinburgh, the test has been found of considerable value in connexion with problem children. In the majority of cases, the test has given definite insight into the worries in the child's life, into his habits and interests, and into his general attitudes to life. In other words, the test aims at revealing the complexes which the child may have formed, and so paves the way for more detailed investigation.

The test booklet of Form B contains three separate tests. In each test there are 25 lines with 5 words in each line. The individual in Test 1 is asked to cross out every word designating what he thinks is wrong; in Test 2 he is asked to cross out everything over which he has ever worried, and in Test 3 he is asked to cross out everything

he likes or is interested in. When this is completed, the test is gone over again, and the individual places a circle round the one thing in each line which he thinks is most wrong in Test 1, which has worried him most in Test 2, and the thing he likes best in Test 3. This encircling gives what Pressey calls the 'idiosyncrasy' score. By giving the test to a large number of individuals the words which are most generally encircled can be found. This constitutes the norm. Any considerable deviation from the norm demands further inquiry. The total number of words crossed out gives the 'affectivity' score, and again a marked deviation from the normal number suggests the advisability of a more detailed investigation.

Collins [1] has constructed a modified form of Test B for use with British children. It is identical with the original Pressey Test, except that American terms unsuitable for British children have been omitted and other terms substituted, and the order of the tests has been altered. The modified form was given to over 1,500 children of both sexes in Scotland and England, whose ages ranged from 11 to 15. The norms obtained were found to differ considerably from the American norms of Pressey.

In Test A Pressey has so arranged the words that they give considerable help to the examiner when the subject's reactions are studied. In Test 1, for example, are arranged words relating to a fear complex, a disgust complex, a sex complex, and a self-feeling complex. In the case of the latter are found such words as 'suspicion,' 'insult,' 'rival,' and so on. Similar hidden classification schemes have been arranged in the other tests. There are also a number of words called 'jokers,' so that if too many of these are marked, careless or flippant work is suspected.

[1] *British Journal of Psychology*, vol. xviii, Part 2, pp. 121–33.

In Test 4 the 'worries' have been classified as they might appeal to five classes of people—the suspicious (paranoid), jumpy (neurotic), self-conscious (shut-in personality), the melancholic, and the hyperchondriacál. These schemes are useful in diagnosis.

Of late, Pressey has been trying-out a scheme by means of which this test may be made to foretell whether the individual will be successful or not in after-life. According to the words underlined and encircled, Pressey is able to show that there is a significant relationship between personality traits, as revealed in his test, and success or lack of success at college.[1]

ASSOCIATION TESTS

Association tests are similar to the Pressey Tests, in that they also reveal the more intimate life of the individual, only they do so to a far greater extent. This mode of testing is one of the earliest, and seems to have been first suggested by Galton, at least in its scientific form. Galton experimented on himself, and, collecting his associations from a large number of words, obtained fairly satisfactory results. He found that the test gave an amazing insight into the workings of his own mind. Binet employs an association test as one of his tests of intelligence, in which the child is asked to give as many words as he can think of in three minutes. The latest development of this mode of testing is its adoption by the psychoanalytic school, where it is used for the bringing to light of repressed complexes.

Association tests can be divided into two kinds. On the one hand, there is what is known as the 'word association' test. In this the child or adult is asked to reply

[1] Pressey and others: *Research Adventures in University Teaching.*

to a given word by the first word which arises spontaneously in his mind. Usually a list of words is prepared, and the experimenter calls out one word after another down the list, the subject responding in each case by giving the first word which the original word brings up in his mind. The starting word is called the stimulus word, and the word which it suggests the response. A stop-watch is used, which records tenths of seconds, to record the time between giving the stimulus word by the experimenter and the response or reaction of the subject. The time is known as the reaction or the association time, and is very important.

The second kind of association test is known as 'continuous free' association. In this type of test only one stimulus word is given, and the subject is instructed to say aloud every word or idea which comes into his mind, whether it appears relevant or not. This method is not a method to be employed out of an analyst's room. It must be left for the specialist. It has a great number of dangers attached to it, and requires long and careful study before it can be used. Its very simplicity is misleading.

In the Word Association Test, as already mentioned, a list of words is drawn up, but among these are scattered at intervals words which are likely to reveal an emotional complex, such words as 'love,' 'fear,' 'hate,' 'death,' etc. The association time is fairly regular in normal cases, and varies from one to one and a half, or two seconds. If, however, the stimulus word is associated with some emotional complex, the subject stumbles over the reply, and the association time may be lengthened. Further, if the series is repeated about an hour later, using the same words, the subject gives exactly the same stereo-

typed replies to the ' innocent ' words, but may think that some of his answers were not satisfactory to the critical words, and on the second repetition changes them.

The list of words which is most frequently used in psychoanalytical practice is that devised by Jung. The list consists of one hundred words. These are selected in such a way as to call up by association commonly occurring emotional states and complexes. The list is used as we have already described. Jung has given this list to a number of normal people and has classified their reactions. His classification is a very important one psychologically, and is of great value practically. The results of any one individual can be compared with the results obtained by Jung.[1]

Another well-known list is that of Kent and Rosanoff, again consisting of one hundred common words. This list was given to a thousand normal subjects, and their responses tabulated, so as to show the number of times each particular response was recorded. ' Table,' for example, followed by ' chair ' was given by 287 persons, ' man ' followed by ' woman ' was the response of 394 persons, ' dark ' followed by ' light ' of 427 persons and so on. Any individual's responses can therefore be compared with this frequency table, and his average frequency calculated, which will then indicate any deviation from the normal.

A different use to which this type of test has been put is that due to Moore, who has employed a word association test for testing the strength of instincts.[2] He has taken as his starting-point the classification of instincts by McDougall. The traits measured in this test are pugnacity,

[1] For classification see Jung: *Studies in Word Association*, Ch. 2.

[2] *American Journal of Psychology*, 1916, vol. xxvii.

fear, repulsion, curiosity, self-assertion, self-abasement, tenderness, gregariousness, acquisition, and construction. As Moore writes, " If we can establish norms for each of these tendencies, and then test a given individual for an excess of pugnacity or for a deficiency in self-assertion, we shall have made a beginning towards a kind of understanding, the social importance of which cannot be denied." [1]

The method which Moore has adopted is to give as a stimulus some word strongly suggestive of a certain kind of emotional situation, and the subject is to react with the first verb form which occurs to him. This is an example of constrained association where the subject has to give a particular kind of reaction, as compared with free association. The assumption is that, in proportion as the emotion is frequently or strongly experienced, the subject will tend the more quickly to respond with a verb reaction appropriate to the emotion suggested. Thus if one of the pugnacity stimuli such as ' enemy,' ' insult,' or ' attack ' is given, a subject by nature very pugnacious may be expected to react with considerable speed, and with a verb form which indicates resentment or attack. If one of the self-assertion stimuli is offered, such as ' career,' ' success,' or ' achievement,' a self-assertive individual may be expected to reply quickly and with such verb forms as ' strive,' ' struggle,' ' attain.'

The subject is given a preliminary list of twenty neutral words such as ' pencil, ' leaf,' ' chair,' and is asked to respond with a verb expressive of his personal reaction to these objects. The average time for these twenty responses represents his normal verb reaction time. Then it is impressed upon him that in the series which follows he

[1] *Loc. cit.*

is to interpret each stimulus word as representative of a situation in which he is personally concerned, and that his reaction verb is to indicate an action which involves himself personally. A list of a hundred words is given, by means of which each of the ten instincts is evoked ten times in irregular order. The subject's score depends upon the response he gives, and the time he takes. A reaction evoked by the suggested emotion is scored by giving twelve points for the instinct in question. If the stimulus brings forth a colourless reaction, which introspection shows to have been unaccompanied by any distinct emotion, the score of that response is zero. If the reaction expresses an emotion different from the one normally expected, as when a pugnacity stimulus gives a tenderness or fear reaction, such as 'enemy-forgive,' or 'enemy-run,' the instinct of tenderness or that of fear is credited with the twelve points, and pugnacity with zero. The score, so far as dependent on speed, means a proportionate increase or decrease in credit according as the time is longer or shorter than the average or normal time.

The one difficulty about this test is that introspection is necessary. The subject has to say whether the emotion accompanying the instinct is present or not, or whether the state of mind at the time of response is neutral. The result, however, is that a definite number of points is allocated to each instinct, and the strength of the instincts relative to one another can be determined for any individual.

Terman has also employed a word association test in order to study the intellectual, social, and activity interests of gifted children. Those intellectually interested are interested in knowledge, and in getting at the meaning of things: those socially interested are interested in persons: those who have activity interests are interested in doing

things. Although Terman had received valuable insight into each child's interests from the parents, teachers, and from the children themselves, he felt that he wanted some objective data. After much preliminary experimentation, Terman finally decided on two comparable lists of sixty words each. In the preliminary try-out the same children were tested with some of the words a second time after a lapse of thirteen months. The correlation between the two sets of results was very high—·856.

The words selected vary considerably, 'summer,' 'easy,' 'diamond,' 'tire,' 'dog,' 'fair,' 'school,' 'help,' 'nature,' 'active,' 'dream,' 'shock,' 'joy,' 'dislike,' 'nut,' 'go,' 'angel,' 'nice,' 'water,' 'boy.' These are the first twenty of the first list. This list of 120 words was given to 689 gifted children, and to a control group of 609 unselected children. By a complicated method of working out the results obtained, the responses given can be scored according to intellectual interest, social interest, and activity interest. Terman found that the results from this test corresponded very closely with the reports from the children's parents, and he claims for the test a fair measure of validity. A child whose score for I (intellectual interests) is 141, for S (social interests) is 129, and for A (activity interests) is 127, has the following descriptive paragraph attached: "Likes history, wants to explore and be an archæologist, loves animals, considered sluggish and inert." With the following scores, I 142, S 116, and A 128, we find the following description: "Literary, prefers reading, literary and artistic bent, quiet, shy." To the scores I 139, S 134, A 122 is appended the description: "Girl, twelve, musical genius, language aptitude, exceedingly attractive, intends to be a teacher."[1]

[1] J. B. Wyman in *Genetic Studies of Genius*, Vol. I, Chap. XVI.

One other test may be mentioned in this category, a test which may be described to all intents and purposes as a word association test, namely the Rorschach Test.[1] The test consists of a series of ten ink blots. These are shown in turn to the subject, who is asked to describe what each suggests to him. His answers are then classified according to a definite scheme, and also scored. This latter allows a 'profile' or 'psychogramm' to be drawn. This test seems to have great promise as a clinical test, and has been used fairly widely in certain countries for purposes of diagnosis.

TESTS OF VOLITION

The June-Downey Will-Temperament Test[2] is one of the most promising tests which have been devised under this head. In this test, by an analysis of the volitional make-up of the individual, the volitional pattern is revealed. This test, based on handwriting, has developed out of a study of graphology, but does not involve any of the assumptions of the graphologist.

Temperament, according to Downey, reveals itself in various patterned forms of activity. These patterns are determined by the amount of energy at the disposal of any individual, and its tendency to discharge into the motor areas. Explosive discharge tendencies result from a high level of activity, inhibited tendencies from a low level of activity. Temperaments range from one extreme to the other. Downey's aim in her test is to measure this level of activity, and the degree of inhibition present. The will-temperament test therefore determines the

[1] *Vide* articles by P. E. Vernon in the *British Journal of Medical Psychology*, 1933, vol. xiii.

[2] *The Will-Temperament and its Testing.*

form assumed by character, and judges such traits as 'adaptability,' 'self-confidence,' 'power of restraint,' 'patience in detailed work,' and other important qualities. The test depends largely on handwriting as a form of activity: normal, slow, rapid, and disguised. The items, twelve in all, are given in a specific order. Each is rated on a score of ten and the final result is drawn in the form of a graph representing the will-profile of the individual.

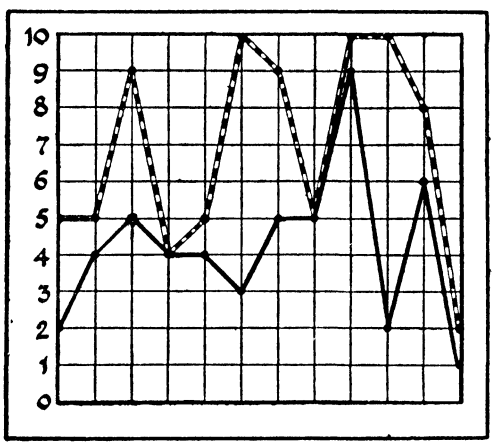

FIG 4.

The twelve traits are divided into three groups of four each. The first group of four represents speed items. If these scores are high, they indicate a quick, flexible reaction. The second group of four indicates drive or personal force, or what Downey calls an aggressive reaction. The third group of four indicates care and persistence, and suggest a deliberate, methodical, careful reaction.

The two graphs above show profiles of totally different

types. The one graph runs at a much higher level throughout. This indicates a strong personality. There is a noticeable difference in the total scores—82 in the one case, 50 in the other. A high total score suggests a forceful personality, a low score a weak or colourless individual.

This upper profile is high on all three groups and gives a three-peaked graph. It represents the profile of a highly successful student. The subject is a girl of strong personality, who has self-confidence with belief in her own opinions. This is confirmed by her assessment of qualities in the character traits, where she scores herself in nineteen traits out of twenty-two as 90 per cent. or above. There is a high score in 'flexibility' which counterbalances to a considerable extent her 'aggressiveness.' She can adapt herself to differing situations, is excellent in dramatic work, for example. Moderate 'speed of decision,' at least a score just below the average, shows carefulness of judgment. 'Interest in detail' also ranks high. The only very low score is in a test to which Downey gives the name 'volitional perseveration.' Downey's explanation of a low score on this trait would be that it indicates lack of perseveration towards a subjectively determined end, that a problem, for example, would only be superficially studied by such a one. It suggests a witty and suggestive mind, but one which does not think out a problem with all its ramifications. This profile is very similar to Downey's mobile-aggressive pattern, the old choleric temperament.

The accompanying profile reveals a different type. The lowness of the graph throughout points to a phlegmatic individual, with an utter lack of self-confidence and 'pep' as Downey would say. This is shown by her low

score in the centre traits. This individual succeeds in routine tests, but is lacking in initiative and energy. She works without enthusiasm, and may be described as lethargic.

The test so far described is the individual form of the June-Downey Test. A group test is also available by means of which about thirty subjects can be tested simultaneously.

This test of volitional make-up seems to yield surprisingly reliable results if used with care, but it is still very much in an experimental stage. It is very difficult to score objectively, and the success or otherwise of the test depends to too great an extent on the personality of the experimenter. The test is also time-consuming, and takes approximately an hour and a half to administer, at least in its individual form.[1]

The Carnegie adaptation of the June-Downey Will-Temperament Test contains a test for self-consciousness devised by Ream. By having the list of character traits checked twice, Ream is able to use the difference in time as a measure of the self-consciousness aroused by the task. His directions for the first checking are, " Check the *one* trait in each pair which is the *better* in most circumstances." His directions for the second checking are, " Check the *one* trait in each pair which describes you better." A number of persons, otherwise quite rapid in their reactions, show considerable blocking when checking these personal traits.

A speech specialist, a colleague of June-Downey, has devised a Will-Temperament Speech Test, by translating the tests into speech as against writing. The new scale

[1] For a discussion of graphology and personality, see *Studies in Expressive Movement*, by Allport and Vernon.

parallels the original scale very closely. Changes are recorded in volume, pitch of voice, and speed of vocalization.

TESTS OF PERSEVERATION

There is one other field of personality in which interesting work has been undertaken. Tests have been devised to measure a trait to which has been given the name of 'perseveration.' Perseveration is the tendency of ideas to linger or to 'persevere' in the memory. The best example, perhaps, is the persistent recurrence of a tune in the head. Some individuals are stronger perseverators than others. When perseveration is strong, the idea recurs spontaneously and readily to consciousness, and so may interfere with other mental activities. Because of the strong effect of perseveration, some individuals find it a matter of extreme difficulty to change over quickly from one mental activity to another. This has been made the basis of many tests of perseveration. For instance, a strong set may be established for cancelling a certain group of letters, and then a second group is given to be cancelled, and the ease or difficulty with which the subject changes over may be taken as an index of his perseverative tendency. Such tests as the Reversed S Test, the Mirror Drawing Test, or the Alphabet and Number Test, all measure this ability to change over from one activity to another, and the interference of the first activity. In the Reversed S Test, the subject writes the letter "S" for, say, 1 minute, then the S is written reversed, "ƨ," for 1 minute, and then the two are written alternately for 2 minutes, S ƨ S ƨ S ƨ. In the Mirror Drawing Test, B C D E F are written continuously for 1 minute, then written as they would appear in a mirror for 1 minute, and then the

two methods alternately. In the Alphabet and Number Test, the letters abcdefg are written continuously for 1. minute, then the numbers 1234567 for 1 minute, and then alternately, a1, b2, c3, etc., for 2 minutes.

The results from these tests have in some instances been applied in the discrimination of character types. Difficult children, for example, have by these tests been found to be either very strong perseverators or very weak perseverators. Also, a further attempt has been made, on the results from these tests, to differentiate between such mental hospital types as melancholia and hysteria.

There is no doubt that the factor of perseveration is very important, but it is doubtful if the tests at present in use are sufficiently reliable to be of much assistance in detecting its presence or absence. The tests themselves are open to serious criticism, for many sources of error creep in during their administration. Further, there seems to be not only a very great practice effect, but amazing variety in score from day to day. Once these difficulties are overcome, however, a valuable factor in personality will be subject to quantitative estimation.

CHAPTER VI

LEARNING

No part of the science of psychology has wider and more important practical bearing than the psychology of learning. It could hardly be otherwise in view of the fundamental part which learning plays in human activities, and even in the activities of living creatures considerably below the human level. The ability to profit from experience, exhibited by modifying behaviour on the basis of what has been experienced, that is, by learning, has long been taken as the characteristic and the criterion of the presence of mind. Strange to say, the implications of this fact have been all too frequently forgotten by many psychologists, who have discussed the phenomena of learning, and by many teachers, whose professional business it is to direct the learning of their pupils. As a result learning has presented itself, both in psychology and in education, in the guise of a process as mechanical and as mindless as it is possible to conceive.

Two familiar proverbs emphasize the part which learning plays in ordinary life. "The burnt child dreads the fire," we say, and we say again: "Experience teaches fools." This second proverb is deserving of rather close attention. The fact is that the more foolish an individual is, the less easily is he taught by experience, and in the limiting case the *utter* fool will not be able to learn at all, which is quite in keeping with the fact that we take the ability to learn as the criterion of the presence of mind. In mere random and meaningless activity there can be no

learning in any real sense of the word, and the same is true of mere meaningless and mechanical repetition. Learning only takes place so far as one's activity is relevant to something; that is, so far as it is in some degree intelligent activity. This point will become clear later. In the meantime there are certain theoretical considerations regarding learning, which must be reviewed before we can pass to the practical applications of psychology in this field.

There are three general characteristics of all mental life, which seem to be at the root of all learning and all memory. The first of these is the characteristic we usually speak of as 'retention.' An alternative term, which is from some points of view preferable, is 'conservation.' Whatever happens to a living organism leaves behind it a definite permanent effect in the organism. Every living organism therefore has its history, so to speak, recorded in itself. Without retention or conservation there could be no learning and no progress of any kind. The second general characteristic is usually spoken of as 'association.' Again an alternative and preferable term would probably be 'cohesion.' The effects left behind in the organism by what happens to it appear to cohere in a peculiar way, so that an organism's behaviour may come to be changed, not only towards an object which has affected it agreeably or disagreeably in the past, but also towards other objects which really did not affect it directly at all, but were simply experienced in the past in connexion with those objects that did affect it.

James is inclined to regard both these characteristics as merely physiological. We shall presently come upon facts of learning which illustrate them, and which are quite inexplicable in anything but psychological terms.

The same is true regarding the third characteristic, which has been called ' perseverance ' or ' perseveration,' which has just been discussed in the previous chapter. This is somewhat analogous to, but by no means identical with, inertia in the physical realm. Any experience or any action tends, as it were, to repeat itself for some little time after it is over. With the lapse of time the tendency rapidly weakens, and to all intents and purposes vanishes altogether, except in abnormal circumstances or under abnormal conditions. Perseveration would seem to play an important part in what is known as ' immediate ' as distinct from ' permanent ' memory. All the phenomena of learning and memory can be explained on the basis of these three general characteristics of mental life, taken along with the fundamental fact that the phenomena themselves are phenomena of mind, manifesting in varying degrees that unique characteristic of mind which we call intelligence.

It is necessary to distinguish different kinds of learning, and these different kinds are best considered as representing different levels of mentality. Three such levels may be distinguished, which may be spoken of as the level of perceptual learning, the level of learning by recall, and the level of rational learning, respectively. At each level there may be several kinds of learning, but however many kinds of learning there may be at any level, they all possess certain typical features in common.

By perceptual learning is meant learning which involves merely response to a perceived situation in a definite way, or in a more efficient way, without the higher mental levels being called into play; that is, without the action being guided by the definite recall of past experience, or by the employment of general principles which are thought

out. This is the kind of learning involved in acquiring skill in some game or some industrial operation. More simply, it is the kind of learning which underlies our almost automatic behaviour when we turn into the right street, and in at the right gate, when going home, or the kind of learning underlying the expert finger movement of the typist or pianist.

Possibly there is a kind of learning which takes place at an even lower level than this. That is the kind of learning—if we can call it learning—involved in the *conditioning* of a reflex or other response, which in some cases, it is just possible, may be purely physiological rather than mental. The process of conditioning a response is best illustrated by Pavlov's experiments on dogs. He found, as we have already seen,[1] that if a bell was rung immediately before a dog was fed, the secretion of saliva, which is the natural result of the presence of food in the mouth, came in time to show itself on the ringing of the bell, whether or not food was presented to the dog. This may be regarded as the simplest of all forms of learning. Arguing on the analogy of the human being, who doubtless also shows increased secretion of saliva on hearing the dinner-bell, we might say that the ringing of the bell *means* for the dog the presentation of the dinner situation, and the normal response to that situation at once begins. In this way conditioning might be interpreted as a simple case of perceptual learning.

Learning by recall is the kind of learning which involves the recall of past experience in the form of image. The most familiar learning of this type is learning by heart. It is the kind of learning we usually mean when we speak of 'remembering.' Rational learning is the type of

[1] See p. 40.

learning which involves the grasp and application of principles, which may have been derived from past experience of situations differing from that which is now presented. That is to say, it involves the higher thought processes, the working out of relations, understanding, judgment, comparison, reasoning, and similar mental functions. Some complex tasks may demand learning at all three levels, but the different levels are nevertheless clearly distinguishable.

FORGETTING

The process we call forgetting is usually regarded as the inveterate enemy of remembering. It is true that forgetting is the opposite of remembering, but at the same time, from a practical point of view, forgetting is almost as useful as remembering. It is at least certain that if we remembered everything, and forgot nothing, our remembering would be of very little service to us. All our time would be taken up recalling every detail, irrelevant as well as relevant to our purposes, if indeed we ever had any time to formulate purposes at all. Hence forgetting is a necessary accompaniment of any useful remembering. When acquiring skill our muscles 'forget' their wrong movements; otherwise the skill would never be acquired. When we use some past experience in a present problem, we forget whatever in the past experience was not relevant to the present problem.

Forgetting is not the simple matter it may appear at first sight. At first sight it seems to be the effect mostly of lapse of time, of what we may call 'obliviscence.' If that were all, however, our older experiences would always be those forgotten, and our most recent experiences

those remembered. This is far from being the case. In fact, the very opposite is frequently our experience. Lapse of time certainly does play a part, but it is only a part in a rather complex drama, if we may use that comparison. In accordance with the law known as Hodgson's Law we select out, and attend to, those items of any complex experience in which we are interested, and with the lapse of time all else gradually fades away, so that what we remember is, as it were, an abridged summary of what actually took place. This becomes more and more abridged, and possibly distorted, as the lapse of time becomes greater, since there are degrees of interest, and those items in which we have the strongest interest are those which have the greatest tendency to survive.

But there is an active forgetting as well as a passive, just as there is an active remembering. There are certain things we try to forget, or at least that we prefer not to remember. Disagreeable or painful experiences fall into this category, especially if they are experiences unassociated with anything we wish to remember. The same is true of experiences which it is disagreeable to remember, as, for example, things of which we are rather ashamed. Sometimes the forgetting of such experiences is a more or less conscious and deliberate forgetting; at other times it is an unconscious process. Most of the phenomena of this kind must be classed as *dissociation*[1] phenomena.

There are still other kinds of forgetting. Sometimes when we try to recall a word or a name, the wrong word or name persists in coming to mind. We may start humming a certain tune and suddenly find ourselves ending with a different tune. We may be trying to learn a series

[1] See Chapter X.

of movements—manual movements or dance movements —and at a certain point a wrong movement puts in an appearance with embarrassing or exasperating persistency. Such phenomena are most often due to the process known as *interference*. What happens may be explained in this way. Let us suppose a certain idea, or it may be movement, has been in the past associated with more than one other idea, or in the case of movement has been followed by more than one other movement. Let us suppose, further, that there is an approximately equal tendency for the first idea or movement to suggest each of the other ideas or movements. Under these circumstances interference may take place, and as a result there may be either temporary inhibition, so that we cannot proceed at all, or the wrong idea or movement may crop up instead of the right.

Expressing the matter schematically, we may say that when *a* is associated with both *b* and *c*, and the association is of approximately equal strength in both cases, *b* and *c* may interfere with each other, and thought or action may be temporarily blocked, or *b* may come where *c* is wanted, or *c* where *b* is wanted. Such phenomena may occur not only as a result of interfering associations, but also as a result of interfering perseverations, and are familiar phenomena in the experience of most people.

Forgetting of a somewhat similar kind may be caused by what is known as *retroactive* or *regressive inhibition*. When we have just done a piece of learning, and immediately turn to another piece of learning of the same or a similar type, the second learning may partly destroy the results in remembering already achieved by the first. The greater the similarity between the two types of learning, the greater will be the effect of retroactive inhibition,

the more unlike they are the less the effect. Hence it is a wise course, after we have done some learning, either to rest, or to turn to work of an entirely different sort.

Forgetting may therefore depend on selective interest, dissociation, interference, or obliviscence. In the normal case it probably depends mainly on the first of these in co-operation with the last, on selective interest and obliviscence, and of these selective interest is the more important. It is sometimes said that we never entirely and permanently forget anything we ever experience. However true this may be theoretically—and it is impossible either to prove it or to disprove it conclusively—it is certain that in a practical and everyday sense we forget much, and, as has been said, it is well that this should be so.

THE ACQUISITION OF SKILL

The common type of learning at the perceptual level, apart from conditioning, is that generally known as 'trial and error' learning. This kind of learning has of late played a prominent part in psychological controversy. Most educational psychologists until recently accepted the account of 'trial and error' learning given by Thorndike,[1] but a vigorous attack on this theory, pressed home in particular by the Gestalt psychologists,[2] has radically altered the situation, at least as far as professional psychologists are concerned. Thorndike's account was based on his study of animal learning, where an animal, in the experiments conducted by him and by other animal psychologists, is set the task either of running a maze or of escaping from a puzzle box by operating the necessary mechanism. In both these cases

[1] *Educational Psychology*, vol. ii.

[2] See Köhler, *The Mentality of Apes*.

Thorndike maintained that the animal begins with more or less random or haphazard movements, and that learning takes place as erroneous movements are eliminated and right movements fixed in, in accordance with the laws of learning as conceived and formulated by him. The first of these laws he calls the 'Law of Exercise.' This can be briefly stated in the form: with every repetition of an action the ease and rapidity of its performance are increased, as well as the tendency towards the action. The second law he calls the 'Law of Effect.' In accordance with this law every action attended by a satisfactory result tends to be confirmed, and every action attended by an unsatisfactory result to be discontinued.

Thorndike's whole account of animal learning in accordance with these laws, and other so-called 'subsidiary' laws, emphasizes random activity, chance success, and repetition, to an extent that is quite inconsistent with and unjustified by the facts of learning. At the same time the very important fact is minimized or ignored that the animal is *trying* to attain some end, that its efforts are directed towards that end with such intelligence as the animal possesses and as the circumstances of the case allow the use of. The point of Köhler's most telling criticism of Thorndike is that he places the animal in such a position that it can only employ low-level intelligence, and then argues that this low-level intelligence is all the intelligence the animal possesses, and is thus characteristic and fundamental in all animal learning.

So far as the human being is concerned, the acquiring of any form of skilled action is the most important kind of learning conforming to the type of 'trial and error' learning. Many erroneous ideas regarding the process

of learning in this case are current, not merely among educated people at large, but even among psychologists and educationists, ideas which conform more or less to Thorndike's account of animal learning. It is quite certain that Thorndike's account corresponds to the facts still less in this case than in the case of animal learning. A skilled action is not acquired by adding movement to movement, as each movement is confirmed by success, until the whole series of movements is complete; nor is it merely a matter of fixing in each movement separately by repeating it again and again, until it is thoroughly stamped in. That is not the way in which the expert golfer has learned to play golf, or the dancer has perfected her dance steps, or the craftsman has mastered the expert manipulation of his tools.

Repetition in the form of practice is of course essential, but mere mechanical repetition will never effect the necessary facilitation of the individual movements and rhythmical articulation of movement with movement, which are necessary to make the action as a whole adequate and skilful. No skilled action was ever acquired by mere mechanical repetition. Nor is it possible to explain how wrong movements are eradicated, and faulty movements corrected, on the basis of mere repetition. On the repetition theory every wrong movement made would tend to be repeated indefinitely, and, since at the start of the learning wrong movements may occur more frequently than right, the result of practice ought to be the fixing in of the wrong movements rather than the right.

If we are to obtain any real understanding of the process, our account of the acquiring of a skilled series of movements must be in entirely different terms. The movements, entering into the action which is to become

a skilled action, constitute from the beginning parts of a whole piece of behaviour, and must be considered in relation to that whole. The golfer or the mechanic from the earliest stage of his learning is trying to carry out an entire act. Each begins with a total response which expresses his aim and intention more or less adequately—less adequately of course at the start. Thus the process of learning is dominated from the beginning and throughout by the aim and intention of the learner. The first attempts may be crude, but they are not by any means chaotic. That is to say, as the Gestalt psychologists have contended, the whole behaviour has a definite pattern from the beginning, however halting and inadequate the actual performance may be. Until the various part movements flow into one another with an easy and smooth rhythm, the pattern is felt as unsatisfying. Every approach to this is felt as a step forward, and tends to be fixed in because it fits into the æsthetically satisfying pattern, which the learner is striving to realize. When it is realized, it is the right feel of the series of movements as a whole that serves as control. This kind of learning is 'trial and error' learning, but not 'trial and error' learning as described by Thorndike.

Because of this character of the series of movements to be learned as constituting a total pattern, the practice of individual movements taken out of the pattern, as it were, can only have a limited value. This procedure may be necessary, however, where such movements present special difficulties of their own. When this is the case the learner for the time being has a new objective —the acquiring of this particular movement—and the original pattern no longer exists for him. When the difficult movement has been mastered he can revert to

the original pattern of the whole behaviour. Only by doing this can he succeed in achieving that smooth articulation of the newly acquired movement with the other movements of the pattern, which it is essential that he should achieve if he is to become expert.

These principles have a special bearing upon the training of industrial workers, which follows on 'time and motion' study, and which is the main objective of 'time and motion' study. Some of the disappointment, which has in the past attended attempts to put into practice conclusions, apparently following from careful and systematic study of the movements of industrial workers, has been due to neglect of these principles. The elimination of unnecessary movements must not be undertaken without reference to the whole pattern of the behaviour involved. As we shall see presently, principles of a very similar character have emerged from the investigation of methods of learning by heart.

METHODS OF LEARNING BY HEART

In committing any material to memory, or learning by heart, several different methods of procedure are available for our adoption. Let us suppose that the material to be learned is a poem of reasonable length—say a hundred or a hundred and fifty lines. We may read the whole poem through over and over again until we can repeat it. Or we may learn it verse by verse, or, if necessary, divide it up into sections, say of ten lines each, learn each verse or section separately, and then put the whole together. Or we may divide it up as before, learn the first verse, and then, repeating from the beginning every time, add verse after verse until we can repeat the whole. Or, finally, we may learn one

verse, then a second, then the two together, then a third, then the three together, and so on to the end. Which of these methods is the best, if by the best we mean that which gives us the most rapid acquisition and the greatest durability of retention? Which best gives us the permanent mastery we seek, and at the same time is most economical of labour?

Experimental investigation has supplied us with the answer to this question. With certain qualifications, which will be noted presently, it can be asserted with confidence that the first, the *entire* or *global* method, is the best, both for rapidity of learning and for durability of retention. The second method is the worst in both respects, and the greater the number of sections into which we divide our material the worse it is. Both the others are very uneconomical as regards time spent in learning, and, as compared with the first, neither gives greater, or even as great, durability of retention.

There are, however, certain qualifications. The material to be learned may be too long for us to apply the entire or global method, though that method has been found in experiments to retain its advantages when the material extended to 240 lines of poetry. Then again, the material must be more or less homogeneous as regards difficulty. If it contains specially difficult parts here and there, the best method is undoubtedly to master these difficult parts first, and then to apply the entire method. Thirdly, the material must present some sort of unity and consecutiveness; columns of numbers, or lists of foreign words or of nonsense syllables, are not suitable material for the entire method. Lastly, the learners must have normal intelligence, and some practice or experience in learning the kind of material.

It is a matter of some interest to inquire how and why this entire method is best, when at a first glance one would almost naturally give preference to the sectional. The explanation can be given, at least partially, on the basis of what has been already said about forgetting and interference. When we learn by verses or sections, in addition to sacrificing the advantage given by the unity of the whole poem, and the consecutiveness of the thought throughout, we make a further handicap for ourselves by connecting in our reading and in our minds the end of each verse with the beginning of the same verse. This interferes with and impedes the connexion we wish ultimately to form between the end of each verse and the beginning of the next, and so delays the learning. Moreover, with the lapse of time older associations tend to survive newer associations. It is a known fact that if two associations are of equal strength but differ in age of formation, lapse of time affects the newer association more than it affects the older, so that the older may still be remembered when the newer is forgotten. In the case of sectional learning the newer associations are those between the end of one section and the beginning of the next, and these may be lost, while the older and wrong associations of the end of a section with the beginning of the same section still remain. Hence the loss in durability of retention. As regards the other two methods the interference handicap is also present, and even more pronounced, so that both are very uneconomical with respect to time. The forgetting is perhaps not quite so marked, but the tendency is present in both cases in spite of the over-learning that has taken place.

Experimental investigation has disclosed other facts relevant to methods of learning by heart. As in the case

of acquisition of skill, mere mechanical repetition is of relatively little value. There must be definite intention to learn. This intention to learn expresses itself by the conscious emphasizing of connexions within the material to be learned. This holds even with nonsense material. With nonsense material the best learner is the learner who can work the material into some sort of pattern as he goes along. With sensible material the connexions are already there, and the more clearly the learner is conscious of these connexions, the more rapidly and successfully does the learning proceed. For this reason, too, sensible material is much easier to learn and to remember than nonsense material.

The question is often asked, how far are artificial aids to memorizing—memory systems, mnemonics, and the like—of service to the learner? The answer is that it depends on circumstances, and on the nature of the aids employed. Many people use, and find distinctly useful, various kinds of ' dodges ' for helping them to remember unconnected facts. One of the present writers found great difficulty in remembering the word ' canteloupe,' until it was associated with ' can't remember,' and the difficulty disappeared. The chief defect of systems of mnemonics is that they really offer more opportunities for forgetting by adding to the facts and connexions to be remembered. On the other hand, in so far as memory systems emphasize known laws of learning, they may occasionally prove helpful. They may assist, for example, in forming some sort of pattern where no pattern exists, or in making connexions where there are no apparent connexions.

THE DISTRIBUTION OF LEARNING PERIODS

. The experimental study of learning in the psychological laboratory has also yielded results of high practical importance in connexion with the problem of the distribution of learning periods or periods of practice. It has been shown that if a certain number of repetitions are devoted to the memorizing of some material to be learned, the manner in which the repetitions are distributed may make a very great difference in the progress and success of the learning. Let us suppose twelve repetitions in all are to be given. We may distribute these repetitions in a number of different ways. All twelve may be taken one after another on one day, or six may be taken on each of two successive days, or four on each of three successive days, or three on each of four successive days, or two on each of six successive days, or one on each of twelve successive days. Of these different distributions the last gives the best result, and the first gives the worst, while of the others the general principle holds, that the wider the distribution the better the result.

The reason for this experimental finding may not be at first obvious. Once more, however, the phenomena of interference and retroactive inhibition supply the explanation. When one repetition follows another without a break, the second to some extent destroys the result produced by the first, the third that produced by the second, and so on. James suggests that it takes some time for associations to settle down and as it were to become established, and he goes on in his epigrammatic fashion to say that we learn to skate during summer and to swim during winter. Moreover, mistakes and chance wrong associations tend to accumulate when one repetition

follows on the heels of another, and through interference to impede the learning, whereas obliviscence affects these if some time is allowed to elapse between the repetitions.

James's illustration really has reference to a different type of learning, the acquisition of skill, but here too the same principle holds. If we have two hours to devote to the learning of something, whether it be golf, the typewriter, or the piano, the worst possible way to use the two hours is to devote them to one continuous period of practice. A better result would be got by taking an hour's practice on each of two successive days, a still better by taking half an hour for practice on each of four successive days. In this case, however, there is a definite limit to economical distribution. Working periods —and the same holds of practice periods—cannot be reduced beyond a certain time owing to the conditions which affect efficiency of work. These conditions, therefore, must be allowed to limit our distribution of practice time.

In connexion with the organization of educational courses, particularly in summer schools, the assumption is frequently made that twenty hours devoted to the study of a certain subject means a definite amount of learning of that subject. This may be spoken of as the 'fallacy of the so-called intensive course.' From what has just been said it is apparent that twenty hours of study may mean very different amounts of progress in actual learning of a subject, according to the manner in which the hours are distributed. If the twenty hours are distributed, say, in two-hour periods five days a week for two weeks, the permanent learning of the subject which results is not likely to be nearly so great as it would be if the twenty hours were distributed over a ten-week term, one-hour periods being taken twice a week.

THE CURVE OF LEARNING

Progress in learning anything through practice takes place gradually, and the gradual effect of the accumulating learning may be represented graphically by a learning curve or practice curve. The learning curve, when irregularities are smoothed out, takes a typical shape (Fig. 5), though its steepness may vary according to the nature of the task, the distribution of the practice periods,

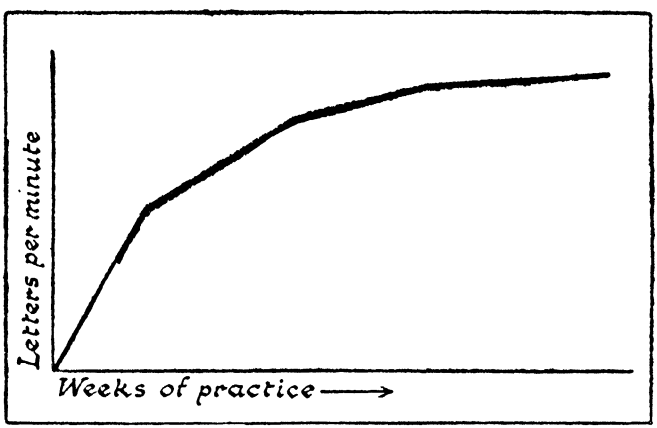

FIG. 5.

individual characteristics of the learner, and so on. In all cases there is a rapid rise at first, then the rate of rise slows down, and finally the curve flattens out.

For most kinds of learning a learning curve can be readily constructed. Let us take the case of a would-be typist learning to use the typewriter. A certain time each day, say half an hour, is given to practice. We can take the number of letters typed each half hour, with the necessary corrections for errors, as the numerical basis

of the curve. The curve follows the course already described, and after a time a level of attainment is reached, beyond which there appears to be no further possibility of progress for that individual. What is called a ' plateau ' in learning has been reached. We then have the typical learning curve. In complex processes, however, like learning to use a typewriter, this is seldom the whole story. If the learner continues practice—not mechanically or automatically, but always with the aim

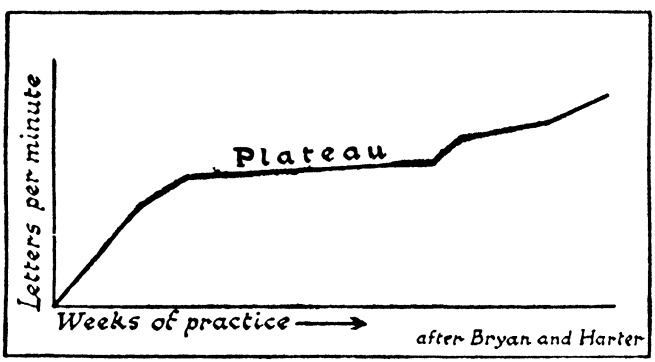

FIG. 6.

of improvement—there may come a sudden burst of ability, which carries the individual along a new learning curve to a higher level of attainment (Fig. 6). This kind of thing may happen more than once. A curve of learning extending over any considerable length of time nearly always shows a series of plateaux—a step-like figure, in fact.

These plateaux have received several explanations. It has been suggested that a plateau may be due to such conditions as discouragement, poor physical health, lack of effort, and the like. Again, it has been suggested that

bad habits may have been formed, which by interference are preventing progress, and which must be eliminated before progress can be made. Another suggestion still is that the method of working, to which the learner has become wedded, is defective, and only when the learner realizes this and employs an improved method, does further progress become possible. All these are possible explanations. There is, however, a more probable, and a more interesting, explanation. The plateau may be regarded as a necessary stage in the learning of any complex task. It is necessary because such learning involves a hierarchy of habits of different grades, and lower-grade habits must be established before higher-grade habits can be acquired. This kind of phenomenon seems to be what occurs in typewriting. The learner starts with the acquiring of the 'letter-habit.' When that is established he goes on to acquire the 'word-habit,' then the 'phrase-habit,' and so on. That is, each advance implies a co-ordination of lower units into higher units. Hence each plateau marks a definite stage in improvement, and each stage requires a certain period in which to become, so to speak, stabilized, before the higher co-ordination can be developed. The plateau, therefore, is a necessary stage in all complex learning, from learning to use a typewriter to learning to speak a foreign language, and if progress is hurried at this stage, actual retrogression may result.

Hollingworth [1] has distinguished three kinds of limits which may be set to improvement by practice. These he calls: (*a*) the *cognitive* limit, (*b*) the *motivation* limit, and (*c*) the *physiological* or *mechanical* limit. The cognitive limit represents a level of performance which, for a given

[1] *Psychology: Its Facts and Principles*, p. 250.

individual and material, is the best that can be achieved by the method being employed. The motivation limit represents the level beyond which an individual does not improve with a given incentive. Even a long-standing and apparently final level of achievement may frequently be left behind, and a far higher level attained, where adequate means of increasing motivation become available. Both the cognitive and the motivation levels are generally below, and often much below, that absolute limit set by the physiological and physical conditions of activity. Most people, as James long ago pointed out, never reach their physiological limit, but are content to work at a level often far below it.

It is important to note that, under the same constant external conditions, individuals differ widely from one another in respect of all these levels. For example, the performance of practised typists, who might be expected to be equally efficient as far as training and experience are concerned, may vary because of technique, or because of incentive and zeal, or because of constitutional psychophysical make-up.

One very effective incentive to further improvement has been found to be self-competition. The stimulation of this has proved successful both in education and in industry. In this case the individual endeavours to beat his own previous day's record, or previous week's record. It has been found that the industrial worker, when his progress in working is represented for him in graphic form, becomes quite anxious to make the curve rise to a higher level, and a similar reaction has been obtained with school-children. This incentive is much superior to competition among the workers or among the children. It gives the slow worker or the dull child an incentive, as

well as the quick worker or the bright child. The slow worker or the dull child is thus set a task within his abilities, since he is only asked to improve on his own record. To ask the slow worker or the dull child to compete against the quick worker or the bright child is to ask something beyond his powers, and can only discourage him and impair his efficiency.

THE TRANSFER OF LEARNING

There is a problem of learning which has very special importance, both theoretically and practically, round which controversy has long raged, especially in the educational field. That is the problem as to whether training in one activity or one subject assists the learning of other activities or other subjects, and if so to what extent and under what conditions. In the rather crude educational theory of the man in the street no dogma is more firmly established than the dogma that certain school studies, as, for example, mathematics, are pursued for the special purpose of training the mind of the child, of teaching him to think. No doubt exists in the popular mind regarding the possibility of training the mind or the memory in a perfectly general way, by exercising it in an appropriate subject. James quotes the statement by a clergyman: "As for my memory, it has improved year by year . . . like a gymnast's muscle." Such a statement represents very well the underlying assumption.

Such a crude theory cannot of course be defended. It involves or implies two fallacies—the exploded 'faculty theory' of the mind, and the idea of developing a mental function in the same way as a muscle is developed. At the same time there are certain apparent facts, which suggest that something of the nature of transference of the

facility gained by practice in one activity to a different kind of activity does to some extent take place.

The problem has been attacked experimentally. James was probably the pioneer in this experimental attack. In his *Principles*[1] he describes an experiment which he carried out with himself as subject in the following terms:

"I have tried to see whether a certain amount of daily training in learning poetry by heart will shorten the time it takes to learn an entirely different kind of poetry. During eight successive days I learned 158 lines of Victor Hugo's 'Satyr.' The total number of minutes required for this was 131⅝—it should be said that I had learned nothing by heart for many years. I then, working for twenty odd minutes daily, learned the entire first book of *Paradise Lost*, occupying thirty-eight days in the process. After this training I went back to Victor Hugo's poem, and found that 158 additional lines (divided exactly as on the former occasion) took me 151½ minutes. In other words, I committed my Victor Hugo to memory before the training at the rate of a line in fifty seconds, after the training at the rate of a line in fifty-seven seconds, just the opposite result from that which the popular view would lead one to expect."

James quotes other experimenters who got results more or less similar to his, but, whatever may have been the case with these others, it is certain that James's own experiment was not satisfactory, since he himself states that when he tested himself after the training he was feeling out of condition and fatigued.

Serious investigation of the problem began with the experiments of Thorndike and Woodworth, the results of

[1] Vol. i, p. 666, footnote.

which were published in 1901.[1] This work was followed by a long series of investigations by American, German, and British psychologists. On the whole, the findings have been against transference to any significant extent of the improvement gained through practice in one mental function to other functions, or the training obtained in one school subject to other school subjects. It has been found, however, that under certain conditions transference does take place. Where two forms of activity involve identical elementary processes, transference of improvement from the one to the other may take place, and to an extent depending on the extent of the identity. Transference may also take place through the acquiring of a technique—as, for example, in learning by heart—which is applicable to other fields than that in which the technique has been acquired.

It has also been shown that, when in the process of learning the learner is made conscious of underlying principles, and when a conscious attempt is made to apply these principles in another field of learning, improvement, as we should expect, may also be shown in this second field. Finally, where ideals are aimed at, rather than mere habits, as, for example, an ideal of neatness, that may affect work in quite different fields from the field in which it was acquired.

The experiments carried out by Winch[2] in this country are deserving of special notice because of the method of investigation adopted. These experiments had as their object the determination of the extent to which memoriz-

[1] *Psychological Review*, 1901, vol. viii, "The Influence of Improvement in One Mental Function upon the Efficiency of Other Functions."

[2] *British Journal of Psychology*, vol. iii, pp. 386 ff.

ing of one kind of material affected the ability to memorize a different kind of material. Winch first of all tested the ability of his subjects to memorize a prose passage from a school reading book. On the basis of this test he divided his subjects into two groups of equal memorizing ability. One group was then practised in the learning of poetry, while the other group did arithmetic. On retesting all the subjects in ability to learn prose, Winch found that both groups showed improvement, but the practised group showed significantly more marked improvement. This ' parallel group ' method of experiment is obviously the best method by which this and analogous problems can be studied. An investigation which may be placed alongside of that carried out by Winch was carried out by Langdon and Yates at Manchester. In this case processes similar to those used in industrial operations were studied.[1] No transfer of training was found.

Experiments on what is called ' cross education ' have some affinity with those experiments we have been considering. It has been found that, as a result of practice with the right hand, improvement in performance of the same operation by the left hand is produced. Scripture, for example, tested with a ' steadiness tester ' the left hands of his subjects. He then practised the right hands for ten days, and on retesting the left hands found very definite improvement. Other investigators have found a gain in muscular power transferred from the right hand to the left in the same way; others still an increase in the rate of tapping. It has even been shown that practice with the hand may produce improvement in a similar operation carried out by the foot.

[1] *British Journal of Psychology*, vol. xviii, pp. 422 ff.

A GOOD MEMORY

We so often speak of having a 'good memory' and having a 'bad memory,' that it may be worth while to attempt to determine what is really involved in a good memory or a bad memory. The qualities of a good memory appear to be four: rapidity in acquisition, durability of retention, readiness of recall, and serviceableness of reproduction. Of these the first is probably that on which least stress would be laid, but all the others must certainly be present before we can speak of a memory as good. A bad memory generally means failure as regards the second or the third or both. In reality, however, failure as regards the fourth, failure, that is to say, to reproduce what is relevant to the business in hand, at the time when we want it, and in the form in which we want it, is a defect of memory sufficiently serious from a practical point of view to warrant us in calling the memory a bad memory. Such a memory is, at any rate, a relatively useless memory, though all the other qualities of a good memory may be present.

Rapidity in acquisition depends partly on natural endowment and partly on good methods of learning. In this respect, therefore, there is some possibility of training the memory in spite of what has been said in the previous section. Durability of retention also depends partly on natural endowment. It depends also, and probably to an even greater extent, on the strength and permanence of our interest in the matter retained, and on the degree in which it has been assimilated and organized. There is a widely prevalent view that these two qualities rarely go together, that those who acquire easily also forget easily, and that those who are slow learners are also sure

learners. Experimental investigations have not supported this view. On the whole, the quick learners would appear to be also the long retainers of what is learned. Why this should be so is not very obvious, unless it is because quick learning takes place owing to native endowment or already acquired knowledge or already existing interests, which make assimilation and organization of what is learned easy, and these factors also conduce to durability of retention.

Another erroneous popular view which frequently finds expression is the view that children have better memories than adults, and generally that the older one is, the poorer his memory becomes, at least in the acquisition of new material. This also is on the whole inconsistent with the facts. If a man is in good health, and not past his prime, he never had a better memory than he has at present. The adult, however, often finds it boring and irksome to undertake a task involving memorizing, whereas the child undertakes such a task readily, and as a matter of course. This is probably the source of the erroneous impression that the child has a better memory than the adult. If the adult will only set himself seriously to the task of memorizing what a school child is toiling at, he will quickly convince himself of his superiority. The impression that one has a poor memory also frequently leads to a distrust of the memory, and to reliance upon substitutes for remembering, all of which tends to make the memory worse than it would otherwise be.

As regards readiness of recall and serviceableness of reproduction, these qualities depend not only on the manner in which what has been learned has been assimilated and organized, but also—and this is peculiarly the case with the second—on the relevance of what has been

learned to the normal life of thought and action of the individual, and its constant use therefore in that life. A man may have prodigious erudition, and yet be unable to reproduce when required a relevant fact or opinion, although these are undoubtedly among the facts and opinions he, in a way, knows and remembers, because these have been acquired and organized for erudition rather than for use.

HABIT

No discussion of learning could be regarded as complete unless some reference were made to what we call 'habit.' Habit may be defined as the result of learning which has proceeded to the point of practically complete automatization of an activity bodily or mental. The classical psychological discussion of habit is to be found in James's well-known chapter,[1] and, apart from what has already been said about learning, little can be added to that discussion from either a theoretical or a practical point of view, as a result of any experimental investigation that has been carried out since the chapter was written. As James says, living creatures are to a very large extent "bundles of habits." The human being is perhaps less a bundle of habits than are animals lower down the scale, but the most superficial observation of the behaviour of even the human being is sufficient to convince us of the enormous part which habit plays in his life; that is, of the enormous number of his activities that have become automatic. A man tends to think and act always along certain lines through force of habit. Each one has his own way of holding a pen, or of crossing his 't's' and dotting his 'i's,' of putting on his coat or

[1] *Principles of Psychology*, chap. iv.

of lacing his shoes, of eating and drinking, walking and talking. In fact, the greater proportion of his everyday activities are largely habitual. It becomes of some interest, therefore, to consider, as James has done to such good purpose, the advantages and disadvantages of habit, and the manner in which habits are formed and established.

Of what use is habit? In the first place, habit makes for economy both of time and of energy. The habitual act is performed more quickly because of the habit. It takes place almost like a reflex—in fact, it may be usefully looked on in many cases as a conditioned reflex. Since the action does not call for attention, or at least any high degree of attention, it frees mental energy for other work, and at the same time itself involves little or no fatigue. In the second place, the habitual action is performed with greater accuracy, and, as a rule, efficiency, than is the same action before it has become automatic. Because of these advantages, it is important that many of our everyday acts should become automatic. "The more of the details of our daily life we can hand over to the effortless custody of automatism, the more our higher powers of mind will be set free for their own proper work."[1] The disadvantages of habit arise from the fact that it fixes a certain mode of thinking and acting, and the more an individual becomes a creature of habit, the less efficiently will he be able to adjust himself to new conditions and to act in new situations. We can all recognize, at least in another person, the mind that has got into a rut from which it seems impossible for it to escape. It is true that, from a social point of view, habit is the "flywheel of society, its most precious conservative agent," as James

[1] *Principles of Psychology*, vol. i, p. 122.

says, but, as far as the individual is concerned, this may not be all gain.

It is a curious thing that in ordinary language the word 'habit' has generally an ethical implication, and is used far more frequently of bad habits than of good. This same tendency is seen also in most psychological discussions of the topic. Bain has devoted a chapter to 'moral habits,'[1] in which he lays down certain valuable rules for the acquiring of good habits or the breaking off of bad. As Bain points out, the peculiar characteristic of moral habits is the presence of two hostile powers which are in conflict with one another. Moral habits, as a matter of fact, always involve more than mere habituation in the sense of learning. There are always affective and impulsive factors, and what we call a bad habit, as, for example, the drinking habit, is in most cases better described psychologically as an acquired appetite than as a habit. However that may be, the practical rules laid down by Bain, and amplified by James, are sufficiently important to be briefly summarized here. Bain's first rule is that when we wish to acquire a new habit or break an old one, we should start with as strong an initiative as possible. His second rule is that we should never allow an exception till the habit is firmly established. To these James adds a third rule, that we should "seize the very first opportunity to act on every resolution we make," and a fourth rule, that we should "keep the faculty of effort alive."

These rules are obviously applicable mainly to habits of the will, so to speak, and especially so in the case of the two added by James. The other two, however, can be given a somewhat wider application. At least the prin-

[1] *The Emotions and the Will.* The Will, chap. ix.

ciples involved are capable of this wider application. In acquiring any habit, whether of will or of thought or of movement, it is important that the start should be as good as possible. The first step counts for a great deal, partly for reasons that have already been discussed earlier in the present chapter, and partly because success itself, or even a little praise given, is a valuable initial stimulus. In the case of those minor habits which we seek to develop in the child, an early start as well as a good start is important. The start should also be simple. If the child has too many things to learn at one time, the learning of one may interfere with the learning of another. If at table, for example, we expect a four-year-old child to sit straight, hold his spoon correctly, take small bites, talk only between bites, it must not surprise us to find our expectations disappointed, should we confuse and annoy the child by the attempt to make him acquire all these habits at once. Such an attempt is a violation of every principle of habit formation and of education.

One last point may be noted. Personal habits, if they are to be formed at all, must be formed in early youth, some of them in early childhood. This is by far the most plastic period, and the period for the formation of what we may call fundamental routine habits. The period during which intellectual and professional habits are formed, on the other hand, is the period after twenty, and before thirty or thirty-five. Such habits are, for the most part, attitudes rather than habits in a strict sense, though many of the same principles apply. "By the age of thirty," James says, "the character has set like plaster, and will never soften again." This is perhaps rather too strong a statement, and the limiting

age is certainly too low. At the same time, it is well to remember that there is a definite period set to the possibility of altering old and established habits, and equally of changing established attitudes of mind and will.

CHAPTER VII

VOCATIONAL PSYCHOLOGY

BECAUSE of the realization of the extent and importance of individual differences, vocational psychology has gradually come into being. It is clear that there may be some trait in an individual's make-up which will make him particularly fitted for work of a certain kind, just as it is certain that there may be some other trait lacking which will make other work peculiarly unsuitable for him, or even impossible. Vocational psychology is an attempt to take into account individual differences on the one hand, and vocational requirements on the other, and as far as possible to fit them together in the concrete case. Two branches of vocational psychology have developed: one in which guidance is given to an individual as to the type of work for which he seems most suited; the other in which occupational tests have been drawn up which will enable the employer to select the most suitable individual from a number of applicants. These two branches are known as 'vocational guidance' and 'vocational selection' respectively.

VOCATIONAL GUIDANCE

To choose a career is to make a momentous decision, for on the choice depends to a large extent the individual's future happiness. To be wedded to a vocation for which one has neither aptitude nor inclination, or for which one has a strong dislike, must indeed make life very miserable. In addition to the constant strain to the individual him-

self, there is great loss to the employer, since spoiled work, imperfect work, off-days, sickness, real or feigned, and constant change of work, can be traced in many cases to unsuitability of worker and work. An interesting example of the effect of uncongeniality of employment came to light in an investigation carried out by the Industrial Health Research Board[1] into cramp among telegraphists. It was found that the cramp was not physical in origin, as it is generally assumed to be, but was prevalent among those workers who temperamentally were unsuited for the work, those in whom the work produced most strain.

Obviously it is wasteful for a boy with mechanical bent to be sent to work in an office, or a girl with clumsy fingers to be apprenticed to a dressmaker. Neither will be too happy in later life, unless they find other compensations, and neither will be very successful. Yet a different type of work for each, making use of the mechanical talent in the one case and avoiding work where neatness and deftness of fingers are essential in the other case, seems an easy solution.

It is strange that the choice of an occupation receives so little consideration. After all, the decision to become a typist or a salesman or a teacher means for most people that that occupation is to be undertaken for the rest of one's life. And what is to be the work of a lifetime should not, common sense would say, be entered upon without due weighing of the pros and cons.

It is difficult, admittedly, to gain inside knowledge of an occupation, even if the individual were old enough to appreciate such knowledge and to ascertain the kind of skill and abilities required. The young boy or girl

[1] *Report*, No. 43.

just leaving school is not much interested in work in general, and rarely has any real leanings towards a particular vocation. The onus of deciding, accordingly, rests on his parents or guardians. Their choice of a career for the boy or girl may be determined by factors very varied in character. Home circumstances may necessitate immediate employment, which means that the first opening that offers is readily accepted, whether it be suitable or not. Or a vacancy in a factory, or in an office near by, may be too tempting to refuse, and the child is precipitated into the business or industrial world without forethought or reflection. Or a place may await the son in his father's office, or the family tradition of entering the ministry, or the medical profession, makes any other decision impossible. Or a chance remark of an acquaintance, or a glowing account of a job by a relative, may be the only foundation—truly a most inadequate one—for the choice of a career. The majority of individuals seem to 'drift into' a job in a haphazard manner. In some cases, curiously enough, the 'drifting' is undoubtedly successful, but in others the result is less satisfactory. The individual may change from one job to another until he chances on one to his liking; he may continue on in a mediocre way without achieving much; or the end may be complete failure.

Vocational guidance is an attempt to place the choice of one's job on a more scientific basis. It tries to guide the individual into a vocation for which he, by reason of his endowment, physical and mental, is peculiarly fitted. This must not be misunderstood, nor must more be expected from vocational guidance than it can give. In some quarters the slogan has gone forth of "one job for one man," implying that there is only one kind of job that

an individual is suited for. It also implies that after tests for vocational guidance have been administered, the individual can be labelled and pigeon-holed a painter, a commercial traveller, a doctor, an accountant, or whatever it may be. That this is an impossibility scarcely requires to be stated. Vocational guidance cannot tie down one job to one man, as it were. It is unable to give such specific advice. What it can do is to give guidance on broad lines. It can advise against a special type of work because of some specific defect, or it can prevent expensive training for jobs for which an individual is mentally unfitted. Further, it can give positive help by narrowing down the choice, and advising certain groups of occupations, leaving, however, a choice within the groups. The function and possibilities of vocational guidance will become clearer as we consider some of its fundamental principles.

PROBLEMS AND PRINCIPLES

It seems advisable to give vocational guidance at as early an age as is practicable. The older person has spent so many years in some vocation already, that it becomes difficult to advise any change which may mean further years of training. The best time, obviously, for giving assistance in choosing a career is when the child is leaving school for that purpose. The age of leaving school, however, varies. Some leave at 14, some at 15, some at 17 or 18, and these are the ages at which advice is most necessary. An earlier stage, however, when the child is 11 or 12, seems the proper time for offering some sort of initial general advice, to help at least in deciding on the type of further education to be followed. Advice given so early must necessarily be very general, because

at this age the character has not yet become set, nor are all the abilities fully developed. A test, however, of a psychological nature will indicate to what extent the child will benefit from further education of the type already given, or whether a different type of education should be aimed at that is more vocational in character or more concrete in nature. The most valuable test at this stage is the general intelligence test. There is little chance of the intelligence either improving or deteriorating as the child grows older. The child of good intelligence should be encouraged to embark on more advanced courses of study; the child of poor intelligence should be advised against such a course, and should be urged to enter for courses more concrete in nature. At later ages more detailed advice can be given. If the child is leaving school at 15, not only can his level of intelligence be assessed, but his scholastic achievements can be recorded, his progress in school work can be noted, and various tests can be administered to evaluate his mechanical bent, his manual dexterity, or other abilities requisite for different jobs for which he may be suitable. At 17 or 18 a similar procedure can be adopted, but as his longer period of education fits him for different kinds of work and opens up the doors to the professions, the special abilities tested may be different.

The inclusion of the qualities to be tested in formulating a scheme of vocational guidance forms an interesting problem. The measurement of the level of intelligence, as already indicated, offers one of the surest guides. The ascertainment of this may prevent a child of high intelligence from entering routine work requiring little or no ability, or a child of dull intelligence from embarking on a course of study aiming at one or other of the

professions. Burt[1] has drawn up a table (see Table 4) in which can be seen the level of intelligence required for various types of occupation. The figures in the third column show the percentage of children falling into each group classified according to their mental ratios. Among

TABLE 4

Level of Intelligence.	Educational Category or School.	No. of Children.	Vocational Category.	No. of Male Adults.
1. Over 150	Scholarship (University Honours), etc.	0·2	Highest professional and administrative work.	0·1
2. 130–150	Scholarships (secondary)	2·0	Lower professional and technical work	3·0
3. 115–130	Central or higher elementary	10·0	Clerical and highly skilled work	12·0
4. 100–115	Ordinary elementary	38·0	Skilled work—minor commercial positions	26·0
5. 85–100	Ordinary elementary	38·0	Semi-skilled work—poorest commercial positions	33·0
6. 70– 85	Dull and backward classes	10·0	Unskilled labour and coarse manual work	19·0
7. 50– 70	Special school for mental defectives	1·5	Casual labour	7·0
8. Under 50	Occupation centres for the ineducable	0·2	Institutional cases	0·2

adults the percentage, shown in the fifth column, is fairly similar, and these have been classified according to their occupations. Such a table shows that there is a broad correspondence between intelligence on the one hand, and vocational requirements on the other. It is not suggested that there is a hard-and-fast line of demarca-

[1] *British Journal of Psychology*, vol. xiv, pp. 336 ff.

tion between the groups, for overlapping must inevitably occur.

A child with a mental ratio of 85, which falls into the group of semi-skilled occupations, should not be advised to embark on a secondary education, and parents should realize that, while such a child can do well in work suited to his mentality, it is cruelty to force him on, hoping that length of education and opportunity will one day make him an analytical chemist or a chartered accountant. At our psychological clinic in Edinburgh we came across a girl of 16 who had developed very peculiar behaviour. She was attending a secondary school, and was found, when tested with an intelligence test, to have an intelligence quotient of 80. Yet she was expected to do well at Latin and mathematics, and all the secondary school subjects, and to keep up with her class. Her efforts were singularly unsuccessful, and only resulted in this peculiar behaviour, which eventually would have issued in a complete breakdown. Another case brought to our notice was that of a boy of 16 of middle-class parents, who was having money spent on him needlessly in a futile attempt to make his low intelligence perform the work of a super-intelligence. It is difficult to surrender one's ambitions, especially if they are centred in one's oldest son, but it is better to accept the situation, and to realize that, if a child has an intelligence quotient of 60, as this child has, his schooling and after-life must be planned accordingly. His after-career must vary considerably, for example, from that of the little boy of 9 whom we interviewed also at the Clinic, and who confessed he was "bored with school as the lessons were too easy for him." This unusual statement is not so surprising when one learns that his intelligence quotient

is 160. To expect these three children, whose cases are cited above, to undergo the same schooling and to follow out the same career, is fantastic. An intelligence test administered at age 11 or 12, and acted upon by parent or guardian, would have been sufficient to indicate the type of further education to be undertaken, and the kind of career to be expected in the future, in each case. Further examination by other tests at a later date would help to narrow down the choice and make a final decision possible.

While the establishing of minimum and maximum levels of intelligence for various occupations is most valuable, and, as already indicated, is one of the greatest helps to the vocational adviser in delimiting the vocational field, other factors, in addition to that of intelligence, require to be considered before making a final recommendation. The child's physique is important; otherwise a physical disability may debar entrance to a desired job. The assessment of the level of educational attainments is also important. A certain level of proficiency in school subjects is required in clerical and semi-clerical work, and also for the professions. Poor arithmetical ability would be a hindrance to an embryo accountant or a banker, and poor spelling to an efficient secretary. It is also desirable to assess temperamental qualities as far as these can be assessed. Usually some form of rating scale is employed, which is filled up by the examiner as a result of his observations during the interview. It is doubtful how much value can be placed on this, as individuals vary in behaviour in different circumstances, but outstanding temperamental traits can probably be detected in a short interview. This may be sufficient to indicate the quiet retiring child who would

be miserable as a commercial traveller, and the child fond of company who would be equally wretched in a job involving work in isolated quarters. Sometimes it may be possible to get the co-operation, not only of the teachers, but of the parents, who may also fill up the rating scale from their knowledge of the child.

The testing, too, of special abilities is very important; otherwise a high potentiality in one of these may go undetected. In an experiment in Scotland in vocational guidance,[1] the investigators came to the conclusion, on the basis of their results, that mechanical abilities are of late development, and cannot be measured with any degree of reliability before the ages of 12 or 13, whereas manual abilities can be measured at any age. Tests of mechanical ability are generally measured by some series of tests of an assembling nature. The best known of these is the Stenquist Series, in which common mechanical objects, such as an electric bell, a mouse-trap, a clothes-pin, have to be assembled, the parts being given to the child without any indication of what is to be made. Constructive ability may be measured by a test such as that devised by Kelly, in which a number of small wooden blocks and pegs of different sizes are given to the child to build with them whatever he pleases. The better the structure, of course, the higher the score. An interesting series of tests for creative imagination is that devised by the National Institute of Industrial Psychology.[2] One of the tests is to give three different stories about a given picture—stories which the picture might illustrate.

[1] "A Vocational Guidance Research in Fife," *National Institute of Industrial Psychology Report*, No. 6.

[2] "A Study in Vocational Guidance," *Industrial Fatigue Research Board, Report* No. 33.

Another, a predictions test, requires the prediction of what might happen if certain things were changed. For example "What might happen if everyone could walk and swim at the rate of 100 miles per hour," and so on. Other tests involve the drawing of original mazes, the designing of eight tea-pots differing in shape as much as possible, the designing of a new pillar-box with improvements on the old one, etc. Other tests of special ability may measure the ability to perceive spatial relationships, or the ability to discriminate colour, or musical ability, or artistic ability, if any one of these is in question.

The results from all these tests give a fairly comprehensive picture of the individual. Other factors, however, may play an important rôle in influencing the final pronouncement of the vocational adviser. The career that seems most fitting for an individual may not be the most practicable, and a choice may require to be made of a second best. The state of the labour market, the conditions at home, the need for instant earning, all play their part in determining a choice, irrespective of the potentialities and talents which the individual may himself possess. In addition, the wishes of the child's parents, and the likes and dislikes of the individual himself, must also be considered.

If vocational guidance is to be effective, an analysis of the qualifications needed for varying occupations is also necessary. In any district in which vocational guidance is to be undertaken, an inventory of the commoner trades entered by boys and girls leaving school is the first step to be taken. This has been done in certain cases, as in the London experiment carried out by the National Institute of Industrial Psychology.[1] Then an analysis of these

[1] *Op. cit.*

particular trades can be attempted. This does not necessarily mean a detailed analysis, such as is undertaken in vocational selection, but a broad grouping of certain essential traits may be all that is required. In the Fife experiment already mentioned, for example, the minimal qualifications for four types of work were drawn up—work in offices and shops, skilled manual work, domestic work, continued education at a secondary school. The qualifications indicated are very general in nature. In work in offices, an intelligence quotient of at least 105 is desirable, a rating above the average in English and arithmetic, obtained from standardized tests, a good rating in temperamental qualities, and a rating above the average in memorizing items. For employment in shops, an intelligence quotient of at least 95 is indicated, a rating above the average in arithmetic, average rating in English, good ability in memorizing items, and a good rating in certain temperamental traits, such as sociability and co-operativeness, combined with an average rating for efficiency in practical affairs as judged from the rating scale. For skilled manual work, to illustrate from a different sphere, an intelligence quotient of 90 or more is essential. In addition, ratings above the average in mechanical ability and in measures of speed of simple repetitive operations are required, as well as an average rating for efficiency in practical affairs.

In investigations into vocational guidance, where a follow-up has taken place, satisfactory results have been obtained. Those children who followed the recommendation given appear to be good at their work, to be satisfied with their prospects, and to change their employment very little. A scheme on broad lines such as has been outlined above should not be difficult for any

Education Committee, or other body concerned with education, to bring into operation. No doubt can be entertained as to its beneficial result, not only to the child, but to the community as a whole.

VOCATIONAL SELECTION

The selection of employees shows the other side of vocational psychology at work. It is important both from the point of view of the individual, and from the point of view of the community, that a firm or business absorbas workers only those with qualities and aptitudes suited to the work. Otherwise dissatisfaction and possibly, if the unsuitability is too evident, discharge may be the lot of the employee, and for the employer a large labour turnover, with its consequent loss of output, spoilt work, and waste of time.

The present methods of selection depend principally on school certificates, testimonials, and references, and perhaps a personal interview. These methods have a certain value, but their value is of necessity a limited one. The school certificates, while good in their own way, may not have much bearing on the kind of practical work the candidate will have to perform in his future occupation. Testimonials and references generally refer to the personal side, or to the moral qualities of an individual, and have little bearing on his abilities as a potential mechanic or printer or shoemaker. The personal interview is the most reliable method of them all, particularly for the assessment of temperamental qualities. But very often, as we have seen in a previous chapter, the interview loses in value because of the unsystematic manner in which it is conducted. To give satisfaction, and to be of real service, the interview must be conducted in as scientific a

way as possible. The traits to be observed in the appli cant, or the information desired, are best noted before hand. And what is more important is that the sam facts about each candidate should be ascertained, sinc otherwise true comparisons are impossible. This i one contribution which psychology is trying to mak to industry—the refinement of the technique of th interview.

It is very difficult to maintain the same conditions fo all candidates. And even if the whole conduct of th interview is standardized, the personal interaction betwee the interviewer and the interviewed can scarcely remai constant. The candidate who comes last in the list fo interview may receive a totally different reception fron the one who was more fortunate in being interviewe earlier. In the same way one who comes after a goo candidate may give quite a different impression from tha which he would have given if he had followed a poo candidate. But the great limitation to the interview i that, although much information of various kinds may b elicited from the applicant, there is still much which mus remain unknown. The essential factors making for suc cess in an occupation can rarely, if at all, be observe during an interview. It is impossible, for example, t assess, during conversation or by observation, the deft ness of fingers required for compositors, or the accuracy o work or initiative necessary for a designer.

Some employers of labour may challenge these state ments, for they claim that from the first impression a applicant makes, his gait, manner of speech, dress, etc. they can judge whether he will be a success or not. Suc factors may be significant in interviewing a prospectiv salesman or a secretary, but do not seem to have muc

significance in the selection of a dressmaker or a mechanic. In fact, where equally qualified employment managers have been allowed to use their own methods of assessing the same group of candidates, the discrepancies have been surprising. The same candidate has sometimes been placed first in a list of fifty by one assessor, and last in the same list by another assessor.

There is no doubt that employers of labour themselves have realized that such methods of selection are not too reliable, and attempts have been made from time to time to substitute others. Some firms, for example, prefer a method of probation for their employees, and take their workers on trial for a certain period. While this may give ultimate satisfaction, it of course necessitates some form of selection before any are accepted for probation, and there is always the chance that the one who would ultimately prove the best worker of all is passed over at the very beginning.

Some attempt at selection of a more satisfactory nature has been forced on occupations where the life of the community is at stake. About half a century ago the cause of a large number of accidents at sea and on land was traced to the inability on the part of the ship's officer or the engine driver to distinguish signal lights. Red-green colour blindness, as has been already pointed out,[1] is fairly prevalent, and nowadays colour tests have been devised in such a way that colour defect can be detected, and no one can enter these two services unless they have normal colour vision. This essential quality must be present before a candidate is accepted for a post. Obviously, as one writer points out, "similar defects may exist in a boy's attention or memory, judgment or feeling,

[1] See p. 20.

thought or imagination, suggestibility or emotion, and they remain just as undiscovered as the defect of colour blindness." [1]

It has thus come about, in recent years, that a demand for some means of testing vocational fitness more adequately than at present has arisen. This is not entirely a new demand, for it existed before the advent of the psychologist and the mental test. The phrenologist, for example, recognized the practical significance of the fact that individuals had different capacities and abilities. Indeed part of the vogue phrenologists enjoyed at one time was due to the fact that they realized how important it was to have the right man for the right job. In books like George Combe's *Phrenology*, we find a large section devoted to the problems of vocational selection.

Let us now examine the various methods which have developed in vocational selection. Two methods of approach are open to the psychologist, a synthetic method and an analytic method.

THE SYNTHETIC METHOD

In approaching the problem of vocational selection from the synthetic side, two methods of procedure are available. A standardized sample of the work may be used as a test. We may test the typist at her typewriter or the mechanic at his lathe. But to be valid, such tests must, of course, be administered under standard conditions. The National Institute of Industrial Psychology, for example, includes the following five tests among others for typists: (1) a speed test—(*a*) with a time limit, (*b*) with an amount limit; (2) an accuracy test, which consists of

[1] Münsterberg: *Psychology and Industrial Efficiency*, p. 31.

copying a much-corrected manuscript; (3) a test for display; (4) a test of tabulation of a complicated list of data; (5) a test of manuscript reading of two very illegible letters. In these tests, which have proved very satisfactory in practice, the candidate is required to reach a certain standard, according as he wants to undertake work demanding a high order of intelligence, or as he is required only for routine work.

The one great objection to this method of testing is that it gives a decided advantage to acquired, as compared with native, ability. The sample test can only be applied after a certain amount of training has been given, but an untrained individual might far exceed a trained individual, after a short period of training. A development of the sample test is the so-called Trade Test which is a standardized sort of interview, for the specific purpose of determining an applicant's familiarity with the line of work in which he claims to be proficient. A set of questions is prepared, in consultation with the foreman for each department, and these are kept on file ready for use. The questions are in every case of a highly technical nature. Below are two questions which appear in such a test for welders and oxy-acetylene operators:

What chemical is mixed with water to form acetylene gas?

What is the pressure on an acetylene tank when filled?

Sometimes pictures of tools, or operations, are shown which the candidate is asked to explain.

Instead of a sample test being given, a test analogous to the job in hand, but not identical with it, may be given. The test is so devised that it presents a situation similar to that to which the applicant has to adjust himself in the real situation. With this method there is the danger that

a test so devised will resemble so closely the actual work that it will become a sample test and give too much weight to training. Münsterberg's test for electric tramwaymen is illustrative of this method, as are also the Hamburg test for electric tramcar drivers and the Viteles motorman selection test. A description of the Hamburg test will serve to illustrate this type of test.

" The subject stands before an endless black band about 13 cm. broad, a length of about 130 cm. being visible, which travels towards him at a constant rate. Single holes and pairs of holes appear in this band at various distances from one another, the former indicating pedestrians and the latter vehicles. By means of a series of lamps, any single hole or pair of holes can be illuminated at different distances from the subject. The danger from a ' vehicle ' is always greater than that from a ' pedestrian,' and the danger from either is increased in proportion to its nearness to the subject. According to the degree of danger, one of three responses is required: the ringing of a bell with the foot, the moving of a lever with the left hand, and the ' putting on a brake ' with the right hand. The conditions in which these responses are respectively required are defined.

" On either side of the moving band, and at some distance from it, are two boxes, each containing a single hole and a pair of holes, either of which can be illuminated independently of the other. These, when illuminated, represent sudden emergencies of pedestrians or vehicles from either side of the track, and the reactions then required are the same as those required for corresponding stimuli on the moving band. Finally, a coloured light, situated some distance from the apparatus, is switched on and off intermittently, and the subject is required

to count the number of times this occurs. All stimuli and reactions are recorded on an electrically-driven smoked drum." [1]

A practice series is first given for about twelve minutes, after which the test proper is presented. The score is based upon the number of inaccurate responses. This is compared with the norms obtained by previous testing of good, poor, and average drivers. The results of this test have been found to correlate very highly with efficiency in the service.

THE ANALYTIC METHOD

The analytic approach to the problem of vocational testing is the one most in favour, since the tests can be given to beginners, not already in any employment. Using this method, we analyse the work to be performed into its elementary constituents, and give, not a single test, but a series or battery of separate tests bearing on these. For example, during the Great War tests were applied in Great Britain to select hydrophone operators. Their duty was to try to localise the position of enemy submarines by a kind of telephone listening. Candidates for this work were tested for accuracy in localising sound, for ability to pick out a certain sound from others, for memory of the pitch of a sound, for discrimination of slight changes in the intensity of sounds. In the industrial world, analytic tests have been devised for a large number of occupations. There are tests for telephone operators, engineers, box-makers, packers, weavers, dressmakers, solderers, and other occupations.

The tests devised for embroideresses and dressmakers

[1] *Report of the Industrial Fatigue Research Board*, No. 12, General Series, No. 4, by B. Muscio.

are illustrative of this type of test.[1] In the case of the embroideress, ability to plan is considered an important qualification, for workers should be able to work out the direction of a design in their mind's eye before actually forming it on the material. To test this the candidate is shown a street map, with houses indicated by numbers. She is told to imagine that she has to drive a car to each of the houses in numerical order, and must always turn to the LEFT, and must pass each house on the left. Tests are also given to test the ability to judge equal distances, which is another requisite for successful embroidery, and this is carried out by means of cards upon which are printed a number of lines, some parallel and others diverging. The subject has to say which are parallel. Tests for artistic taste are also given; these consist of showing to the applicants a number of coloured drawings of flowers, and asking them to sort them, according to their personal tastes, into 'good,' 'bad,' and 'indifferent.' To test co-ordination of hand and eye, or to find whether the applicant can aim straight, the candidate is given a sheet of squared paper and a pencil. A metronome is set beating one stroke per second, and the girl is asked to make a dot at the corner of every other square, keeping time with the metronome. Next she is given a pin, and the test is repeated, only this time she has to prick upwards from beneath the paper. Other tests measure speed of movement and resistance to distraction—the latter an important factor in a worker.

Some of these tests are equally valuable for dressmakers. In addition, however, in testing for dressmaking, the candidate's lightness of touch is ascertained by giving her

[1] By Winifred Spielman Raphael of the National Institute of Industrial Psychology.

a square of tissue paper to fold as if it were being hemmed. The powers of observation of the candidate are determined by showing her two fashion plates for a very short time, and then seeing how complete a description of them she can give. In order to test the candidate's memory for complicated instructions, a description of a dress is read to her, and after a quarter of an hour's interval she is asked to write down as much of it as she can remember. Tests of vision and a medical examination are also given.

It may be asked, how are these tests devised, and how is it known that they really do select the right people, the people who will make good at their job? The procedure adopted is lengthy, and not so simple as it appears on the surface. The occupation for which the tests are to be devised has to be very carefully studied over a period of time. Very often, in addition to watching the workers, and trying to get at the difference between a good worker and a bad worker, the industrial psychologist himself learns the job, and by observation of his own difficulties gets an insight into the necessary qualifications. Time and motion study may also be utilized, and valuable information is obtained from foremen, managers, and the workers themselves.

The first stage in preparing the tests is to make an occupation analysis, or a 'job' analysis, of the work in question. In laundry work,[1] for example, this has been done as follows. The different departments are distinguished to begin with, such as *sorting*, *washing*, *calendering*, *ironing*, and so on, and then the jobs in each department are carefully distinguished. In the *calendering* department, the different occupations can be separated

[1] "Occupation Analysis." *National Institute of Industrial Psychology Report*, No. 1.

into *preparer* or *shaker-out* (one who shakes and folds flat the articles for the feeder), *feeder* (one who feeds the machine), *taker-off* (one who receives the work at the back of the calender machine), and *folder*. The duties of each of these are then carefully recorded and analysed. Let us consider the position of the folder. First comes a description of her duties; the folder, with the assistance of the taker-off, folds the articles to suitable dimensions to fit the baskets. Then as regards the qualifications desirable:

Intelligence.—Below average sufficient.

Special Factors.—Attention to blemishes and ability to judge sizes for folding to fit baskets.

Manual Skill.—Large arm movements, average accuracy, good speed, rhythmic body movements.

Temperament.—Care, ability to resist monotony. No experience necessary.

Physical.—Good physique. Long hours standing in steamy atmosphere.

When this has been done for each job in each department, one can clearly see how very valuable it is.

The next stage is to devise tests which will measure these essential traits. Many preliminary questions require consideration at this point, such as whether the tests are to be given individually or to a group at once, whether they are to be pen and paper tests or performance tests. Once the tests have been devised and selected, the method to be used in explaining the test to the candidate, and of scoring the test to make the whole procedure as objective as possible, must be carefully considered.

Then comes a very important stage when the tests themselves must be tested to see if they are really of diagnostic value. A group of workmen or workwomen is chosen, including good, poor, and mediocre workers, and

the tests are administered to them. The results of the tests are then compared with the efficiency of the workers at their work. Output records are very valuable for this, and may be supplemented by the opinions of foremen and managers, who may be asked to arrange the workers in order of merit, as regards the efficiency of their work. If efficiency in the test corresponds with efficiency in the work, and if a poor result in the test corresponds with low work efficiency, then we are justified in concluding that the tests are of value. Only those tests are retained as selection tests for the occupation which show a considerable measure of correspondence, or correlation, between test results and work results.

For practical purposes it matters little whether there is a slight discrepancy between the two rankings of efficiency. The important point is whether, taking, say, the top 60 per cent. of the workers, any skilled workers fail to pass the tests, and any relatively unskilled workers succeed in passing the tests.

In addition, the selected tests ought to be applied to a large number of persons of the same age, sex, and standing as those who are likely to seek to enter the occupation in question. In this way knowledge is obtained of the kind of score which the average applicant would make in the various tests, and of what constitutes a good or a bad performance.

An interesting example of the employment of analytic tests in a different connexion is the use made of them by Seashore for the testing of musical ability. Seashore has devised tests for thirty separate processes, which to him are involved in, and essential to, the possession of musical talent. These include tonal hearing, time sense, rhythm, acuity of hearing, musical appreciation, musical expres-

sion, etc. The test record of an individual is presented in the form of a psychograph, showing the performance in each test separately, instead of giving merely a total score. This reveals clearly and at a glance any deficiency in the musical make-up of an individual.

This method is also utilized by the National Institute of Industrial Psychology in a test devised by them for motor drivers. Their series of tests include the testing of such traits as reaction time, resistance to distraction, vigilance, vision, visual co-ordination, judgment of spatial relationships, confidence, manipulation, etc. The result of each test is scored separately, and a psychograph drawn from the results. This reveals at a glance any deficiency in the make-up, so far as car driving is in question, and according to the traits, prognosis can be made as to whether learners can improve with proper training and practice.

In conclusion, we must emphasize the fact that, excellent though all these tests are, the results from them cannot be taken as the sole criteria when engaging workmen. Everyone knows that ability for work is not the only quality making for success; temperamental qualities may be even more important. At the present moment it is not easy to assess these, and the interview must be utilized for this purpose. Some form of vocational tests, together with some form of standardized interview, seems to be the best means for the selection of the employee.

CHAPTER VIII

PSYCHOLOGY OF WORK

CONDITIONS OF WORK

THE application of psychology to conditions of work has been marked by steady progress. The main object throughout has been to improve the conditions of work, thereby making them as congenial as possible to the worker. The investigations have mainly taken the form of studying the causes productive of fatigue with a view to eliminating certain sources and if possible reducing others.

It has been found useful to regard fatigue from two angles, and to distinguish between what has been called unnecessary and necessary fatigue respectively. Fatigue produced unnecessarily stands in a different category from necessary fatigue, for once the former is discovered it can in most cases be eliminated ; whereas necessary fatigue—the fatigue which is the inevitable accompaniment of all kinds of work, muscular or mental, if that work is prolonged for any length of time—cannot be eradicated, although it may be capable of considerable reduction. It may be a new conception to regard fatigue in some cases as unnecessary, yet many investigations have brought to light the numerous ways in which this unnecessary fatigue may be caused, and have shown how it can be eliminated by a slight change here or a small alteration there. A few illustrations will indicate the nature and value of this line of investigation.

UNNECESSARY FATIGUE

One very important cause of unnecessary fatigue, for example, arises from the posture of the worker. The worker has often to stoop over his work because of the fact that the table or desk he is working at may be too low. His back and arms begin to feel the strain, and the cumulative effect by the end of the day may be pretty considerable. If the table is heightened, so that the worker can work comfortably without having to stoop, his tiredness is to a large extent diminished. This applies not only to the factory worker at his work, but to the clerk at his desk, or to the housewife at her home duties. The opposite condition, in which a table is so high that the worker has to stretch up to it, is equally fatiguing. A simple heightening or lowering of a table or other appliance is often sufficient in itself to reduce the accumulation of fatigue.

Again, fatigue at work is often caused by the worker standing all day at his work. For years, it may be, the work has been carried out standing, and because of custom and tradition, the procedure remains unaltered. It has been comparatively easy in some factories to arrange matters so that the worker can be seated at his work, or can sit and stand alternately. This not only lessens the monotony of the work, but reduces the fatigue. Very often, too, when such changes are introduced, the worker actually gets through more work.

Another source of fatigue is due to the bad arrangement of tools. If a worker has to look for a tool every time it is required, he is bound to lose valuable time in addition to experiencing irritation at delays. So also, if he has to stretch unduly every time he requires a certain

tool, or if he has to walk two or three paces for it, a fair amount of unnecessary fatigue will accumulate as the hours pass on. Christine Frederick in her book called *The New Housekeeping* illustrates the bad arrangement of tools rather aptly. "'I recall a young bride," she says, " who recently showed me her new kitchen. ' Isn't it a beauty ? ' she exclaimed. It certainly had modern appliances of every kind. But her stove was in a recess of the kitchen at one end. Her pantry was 20 ft. away at the opposite end. Every time she wanted to use a frying-pan, she had to walk 20 ft. to get it, and after using it, she had to walk 20 ft. to put it away. . . . When I see such a kitchen I am reminded of the barker I once heard outside of a country circus. ' Ladies and gentlemen,' he was calling, ' come in and see the great African crocodile. It measures 18 ft. from the tip of its nose to the tip of its tail, and 18 ft. from the tip of its tail to the tip of its nose, making in all, ladies and gentlemen, a grand total of 36 ft.' How many women are ' making a grand total of thirty-six steps ' every time they hang up the egg-beater ? "

Unnecessary fatigue may also be caused by the worker being undecided what to do next, or having constantly to be making little decisions. In an investigation into packing chocolates carried out in one factory, girls were found to be wasting time, and becoming unnecessarily worried, because of having to decide each time what arrangement of chocolates to make. By having a system, so that different chocolates could be picked up in a definite order, thereby eliminating the necessity of making constant decisions, output was increased, and strain and tension diminished. The same principle can be applied to almost any type of work.

Bad illumination is another source of unnecessary fatigue, as is also bad ventilation. It is not only poorness of lighting and shadows in the work-room that cause overstrain and fatigue. A light, good in itself, but set up in the wrong place, is often sufficient to do so. A worker who works facing a bright light is working at a disadvantage. Similarly, a worker with a bright light in his marginal field of vision is not working under the best conditions of illumination. The bright light is always catching his eyes and distracting him, as well as involving a number of involuntary muscular movements of the eyes, as they turn reflexly towards the source of the light. By the end of the working day the strain and discomfort experienced may be quite considerable. A system of uniform lighting over the whole visual field seems to be the most satisfactory arrangement. This is what makes natural lighting so superior to artificial lighting. But even with natural daylight, the lighting may have a deleterious effect on vision. Windows may not be placed in the proper positions, walls may be coloured wrongly, and glare may occur from polished surfaces. These conditions, of course, may in some cases be rectifiable—the polished surfaces may be made dull, the highly coloured walls may be painted grey or white, and if the windows themselves cannot be altered, the substitution of ground glass for clear may be distinctly advantageous.

Inferior ventilation has equally deleterious effects both on worker and work. A room which is not well ventilated causes lassitude and weariness to the worker which in turn may produce a drop in output. An inquiry into the output of the manufacture of tinplate,[1] where adequate ventilation is extremely difficult, because of constant radia-

[1] *Industrial Fatigue Research Board Report*, No. 1, by H. M. Vernon.

tion from the hot metal, revealed a drop of 10 per cent. in output in the month of August, when the temperature was high, as compared with that in the month of January, when the temperature was much lower.

The feeling of lassitude produced by a badly ventilated room is due to the condition of the air surrounding the worker's body, and not to the change in the constituents of the air itself, as is commonly thought. The body is constantly producing more heat than it requires, and has to get rid of the excess in some way. If the air surrounding the body is higher in temperature than the body, the body cannot by radiation rid itself of its superfluous heat. Or if the air is already humid, that is over-saturated with moisture, it cannot absorb the perspiration thrown off by the body in its attempts to get rid of this waste heat. When, therefore, the temperature is too high, or the air too humid, overheating of the body occurs, and it is this which produces weariness, and lassitude, and discomfort. In this connexion Poffenberger [1] quotes the results of experiments carried out by the New York State Ventilation Commission. A number of individuals were kept in an airtight chamber with the air unchanged for a number of hours; the usual symptoms of poor ventilation showed themselves. When they were allowed to breathe fresh air by means of tubes leading from the outside of the room, these symptoms did not disappear. When an individual on the outside of the room breathed the much-used air from within theroom by means of tubes, he did not show the symptoms. Hence the character of the air that was breathed was not the cause of the symptoms. It was found that any change which would produce the necessary radiation of heat from the body reduced the feelings of discomfort and lassitude.

[1] Poffenberger: *Applied Psychology*, p. 170.

Good ventilation, therefore, does not so much depend on the introduction of pure air as on any method which will cause air movement or air circulation. Disturbing the air, by introducing electric fans or any other device, is the chief aim in any adequate system of ventilation. This enables the hottest air to be driven away from the body, thereby causing the surplus heat from the body to be adequately radiated, a function which research has established as being the main function of ventilation.

The relationship between noise and fatigue is more difficult to study, since it is difficult to assess accurately the effect of noise under industrial conditions. The noise of machinery in a room cannot be eliminated without causing complete or partial cessation of the work. It seems preferable, however, to work in quiet surroundings rather than in noisy ones, and where workers on a quiet job, such as a clerical staff, have been removed to quieter premises, away from the clamour of machinery, output has increased and fatigue has diminished.

In the laboratory, however, experiments have been devised to measure the effect of noise, one of the earliest of which was that carried out by Morgan.[1] Morgan used a substitution test, in which letters had to be substituted for numbers, and *vice versa*. Quiet periods of work alternated with noisy periods. In six out of the eight subjects, output increased during the noisy periods, both in quantity and in quality. But the energy expended was much greater, as shown by increased key pressure, and differences in breathing records. In an experiment by Laird [2]

[1] J. J. B. Morgan: "The Overcoming of Distraction and Other Resistances," *Archives of Psychology*, 1916, p. 35.

[2] D. A. Laird: "Experiments on the Physiological Cost of Noise." *Journal of the National Institute of Industrial Psychology*, 1929, pp. 251–8.

the average expenditure in typing under noisy conditions was 71 per cent. higher than during the resting period, compared with 51 per cent. increase during quiet periods of work. Bartlett,[1] in an experiment conducted in Cambridge, found that the presence of noise was followed in most cases by an initial drop, either in the quality of the work done, or in the quantity, or in both. This, however, was very small in amount, and not statistically significant, except in a few cases. The louder the noise, the greater the effect, but intermittent noises of great intensity were most disturbing. Intense irritation and annoyance with the noise were exhibited at the beginning of the experiment, but passed away in a few minutes with some, in an hour or two with others, in a day or two with others. The feeling of irritation, however, was found to be perfectly consistent with a high level of performance, and the apparently harmful effects of noise, whether objective or subjective, tended to disappear rapidly as the observers became used to the conditions of work.

Bartlett's main contention, based on these experiments, is that noises may cumulatively cause strain and irritation, but it is wrong to assume that such must inevitably be the case. An alternative is possible. The noise may be accepted as part of the working background, and as such becomes assimilated to it. When this occurs—and Bartlett seems to suggest that this second alternative is the more usual one—no conflict ensues between work and noise, and consequently there is "no necessary slow piling up of harmful effect." When strain and fatigue do appear, other causes are generally to be found.

Vibration is a close ally of noise in provoking discomfort. Constant vibration means constant minor muscular

[1] F. C. Bartlett: *The Problem of Noise.*

adjustments to counteract the vibration, and these cumulatively are a by no means negligible cause of fatigue. In one factory there was considerable vibration experienced from power-driven sewing machines. This was somewhat alleviated by providing felt pads as foot rests, and by resting each leg of each chair on a heavy spring. These remedial measures absorbed the bulk of the vibration, and discomfort and fatigue were very much diminished.

NECESSARY FATIGUE

We must now turn our attention to that necessary fatigue which accompanies all kinds of work, if that work is carried on for any length of time. Fatigue reveals itself in a decreased capacity for work, and the output may be affected either quantitatively, or qualitatively, or both. Or the feeling of weariness may supervene, and the individual *feel* tired. There is, however, no necessary correspondence between the objective decrease of output and the subjective feeling of weariness. Sometimes the feeling of ennui, or boredom, or weariness may appear alone without any apparent change in output, and be mistaken for real fatigue, but this 'simulated fatigue,' as it has been aptly called, disappears rapidly if a fresh occupation is engaged in. Conversely, the individual may be thoroughly fatigued, but experience no concomitant feeling of weariness. When this occurs it may lead to serious consequences, for the individual may continue to work on, and overdraw on his resources. The subjective aspect of fatigue, as we may call the *feeling* of fatigue, is often caused by disinclination for the work in hand. In industrial concerns, as in other places, this may lead to a slowing down of the work, in order to com-

pensate for the unpleasant feeling, a slowing down which may be quite unconscious on the part of the worker.

Attempts have been made from time to time to measure the presence of fatigue. Two methods have been adopted. In one, the continuous method, the work itself is tested at regular intervals, and quantity and quality compared. In the other, the interpolation method, the work is interrupted at regular intervals, and a test is given quite different from the work in hand, the assumption being that, as the worker becomes fatigued at his work, his fatigue will reveal itself in the test, which will suffer both quantitatively and qualitatively. The difficulty with this second procedure is that the introduction of an activity different from the work engaged on brings fresh interest, and so defeats its own ends. The tests too, used as interpolation tests to indicate the presence of fatigue, are not altogether satisfactory.

One of these tests is the Æsthesiometric Index or Spatial Threshold, that is the smallest distance at which the two points of a pair of compasses placed simultaneously on the skin, say on the back of the hand, can be discriminated as two points. The special apparatus employed is known as the æsthesiometer. The determination of this æsthesiometric index, or spatial threshold, was thought at one time to give a very clear and reliable indication of the presence of fatigue, as the threshold varies according to the amount of fatigue present. There are so many factors, however, affecting the result, that the test is now discarded as a test of fatigue.

Another method of testing sometimes used was the determination of the individual's sensitivity to pain. This also has been rejected as a test of fatigue, as it is still doubtful if pain sensitivity is increased or diminished when the

individual is fatigued. Rate of tapping is another measure which has been on occasion adopted. The rate of tapping when in a state of fatigue is compared with the normal rate of tapping. The reversible-perspective test of Ash appears to give a very delicate index of fatigue. The material for the test consists of a simple figure (see Fig. 7) which can be seen in either of two ways. It is impossible to maintain the one aspect for any length of time, for in a few seconds the figure becomes reversed. The subject has some measure of control over the rate of reversal, but when fatigued, the control becomes impaired. This test, though in some ways satisfactory, has one great disadvantage, namely that the experimenter is entirely dependent on the goodwill of the individual undergoing the test, since he has no method of objective control.

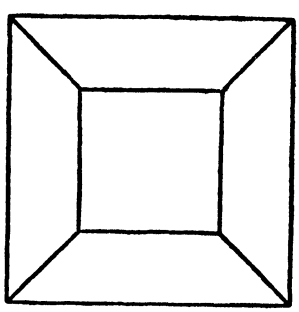

FIG. 7.

McDougall's dotting test is a test also used to indicate the presence of fatigue. In this test, a moving paper tape passes behind a narrow aperture. On the tape are small circles arranged in various positions. The individual is instructed to strike with his pencil the dot in the centre of each circle as it passes the narrow aperture. The average number and magnitude of the errors made together with the omissions form the basis of comparison. The ergograph, which measures muscular contractions, has also been one of the most useful pieces of apparatus for the study as well as for the measurement of fatigue. It is so arranged that the middle finger lifts and lowers a

weight rhythmically in time with the beating of a metronome. The height of each contraction of the finger can be recorded by means of a lever on a kymograph, and the final result indicates not only the number of contractions made, and the total height to which the weight has been lifted, but also the height of each separate contraction, which generally diminishes as fatigue sets in.

THE WORK CURVE

The measurement of the work itself yields the most valuable results. We may take it as a general rule, that

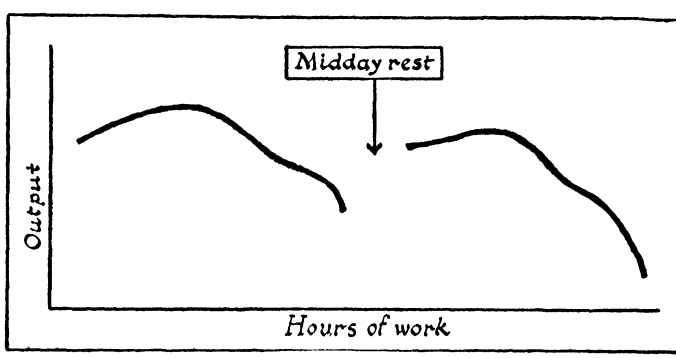

FIG. 8.

when an individual becomes fatigued, assuming it is real and not simulated fatigue, his output suffers. The rate of the decrease in output corresponds roughly to the rate of the onset of fatigue. If the working day is divided up into regular periods, and it is possible to assess the output quantitatively for each period, a curve of work may be drawn. The work curve, as it is called, takes on a fairly typical shape, no matter whether the work is muscular, manual, or mental in character (see Fig. 8). There

is an initial rapid rise to begin with, as the worker gets warmed-up to his task. Then the curve gradually rises until the maximum level is reached. The work may continue at this level for some time, then finally a gradual decline makes its appearance, as fatigue supervenes, causing the curve to fall. The break in the middle of the day helps to reduce the fatigue, and on his return to work the worker commences at a higher level than that at which he left off. There may be another warming-up period, another rise to a maximum level, and then a bigger drop in the curve, due to fatigue, as the afternoon wears on.

The curve, of course, is not so smooth and regular as that depicted above. There are many fluctuations due to various causes such as distraction, worry, incentive, interest. *Intermediate* spurts are often in evidence as the worker puts forth a little extra energy, to compensate perhaps for a momentary pleasing day-dream or lapse of attention. In addition, an *initial* spurt often appears at the beginning of a piece of work. The worker starts at a speed at which he is unable to continue for any length of time, and he has to slow down until warming-up and other factors cause the curve to rise again. A *final* spurt occasionally appears too, especially if the worker becomes aware that he is nearing the completion of his working spell. The recognition of a speedy termination of his toil gives him fresh energy, his tiredness is forgotten, and his output once more increases.

If, however, we neglect these initial and final spurts, and also smooth out the curve by eliminating all the intermediate spurts, and all the variations due to innumerable small factors, the work curve assumes the typical shape shown above. It is influenced by four factors: warming-

up or incitement, adaptation or settling down, practice, and fatigue. The factor of incitement or warming-up is shown at the beginning of any piece of work and combines with the practice effect in causing the initial rise. Adaptation consists in the worker adapting himself to the piece of work in hand, settling down, so that he is free from all distraction. It is largely a matter of attitude and mental alertness. The effect of practice varies according to the skill of the worker, and its results are more noticeable in the case of a beginner than in the case of a more experienced worker. Fatigue causes the fall in the curve, and the greater the degree of fatigue present, the more does the curve fall to a lower level.

Study of the work curve may show if any artificial restriction of output is present. This can be inferred if the average output shows very little variation from day to day, if the curve throughout the day is unduly uniform, if the curves of various workers appear very similar, or if there is a sudden and unusual increase towards the end of the day—a spurt necessary to bring the output up to its usual stereotyped total.

The shape of the work curve was thought at one time to be determined by the daily organic rhythm. But Hollingworth [1] carried out tests on ten subjects over a period of ten days, trying out different types of work. He has shown that the same kind of curve of efficiency is obtained when the work begins at 10.30 a.m. as when it begins at 7.30 a.m., the curve as a whole being shifted somewhat ahead. Efficiency at any period of the day appears to depend upon the number of hours spent at work immediately preceding the period of observation, and not on any organic rhythm.

[1] *Psychological Review*, vol. xxi, p. 473.

WORKING TIME

The question now arises—can this fatigue which we have called necessary fatigue be reduced in any way, so that the worker may not be so fatigued by the end of the day? One method which has been introduced, with good results, to alleviate somewhat the effects of fatigue has been the reduction in the length of the working day. A shorter day, within limits, with fewer hours of work, means less accumulation of fatigue, as might be expected. Where factories have been compared, doing similar work, one with a shorter working day than the other, the output of the former has generally equalled, if not exceeded, the output of the latter.

An interesting finding which has emerged from scientific investigations into the shortening of the working day is that shortening of hours does not bring immediate results. A period of adaptation seems to be required before there is any noticeable effect. The worker, as it were, unconsciously adjusts his effort to the length of his work period. In fact, it is because of this that shorter hours yield as high an output as obtained under the previous conditions. In the case of steel smelters,[1] for instance, when the length of the working period was reduced from twelve hours to eight hours, no improvement took place of any kind until two months later, but after thirteen months under the new conditions, the improvement was as much as 18 per cent. When adaptation has been effected to shorter hours of work, if the longer hours are restored the output reverts to its previous amount. This seems to indicate that overtime is uneconomical. The hourly output will become lower, and remain so when overtime is abolished, until another long period of adaptation takes place.

[1] H. M. Vernon : *Industrial Fatigue and Efficiency*, p. 264.

Another attempt which has been made to reduce fatigue in work is by the introduction of systematic pauses for rest. It is fairly well known that workers themselves snatch periods for rest at odd moments, but this is done surreptitiously, and their full benefit is thereby not obtained. The introduction of recognized pauses would only be giving official sanction to a practice which seems in many cases already to exist. The theory lying behind the introduction of a pause for rest is that it may be possible to reduce somewhat the fatigue before it has accumulated to any great extent. That this is possible has been tested with the ergograph. Any individual who lifts the weight of the ergograph continuously soon experiences fatigue, and the fatigue becomes so great that the finger is incapable of any further contractions, and must be rested before the weight can once more be lifted. If, however, a pause of ten seconds is allowed after every contraction, the interesting point is that the individual can continue lifting the weight indefinitely without any apparent fatigue resulting. A continuous series of fifteen contractions without a pause produces a certain amount of fatigue which, however, can be eliminated if a pause is allowed of half an hour. This means that after the half-hour rest, a second set of contractions, as good as the first, is possible. If thirty contractions are carried out continuously, a much longer period of rest is essential—two hours—before a second set of thirty contractions is possible.[1]

Let us consider these three results as typical results and discuss their practical significance. If the job in a factory chanced to be lifting weights with the middle finger, which arrangement of work would give the most economical

[1] See Muscio's *Fatigue* for a discussion of results with the ergograph.

results to employee and employer? Suppose the working day to be a six-hour one. One worker may adopt the first method, that is continuous lifting for thirty contractions, following each set of contractions by a two-hour rest. A second worker may adopt the second method, that is continuous lifting for fifteen contractions, following each set of contractions by an half-hour rest. A third worker may adopt the third method, that is one contraction at a time, following each contraction by a ten-second rest. The output of the first worker at the end of a six-hour day equals 120 contractions, the output of the second worker 195 contractions, and the output of the third worker, who is able to work continuously, 1,800 contractions. In other words, taking this hypothetical case as typical, we may assume that the more frequent the rest pauses, the more beneficial they seem to be. We are making no assumptions, of course, about the quality of the lifts each time, but only considering the matter from a quantitative aspect.

The same type of result has been obtained wherever pauses have been systematically introduced. The pause has invariably resulted in increase of output, and coincident with this, the workers have felt less fatigued. To cite a few results actually obtained in practice will be sufficient to indicate the advantage which accrues. In work involving tying small packages, a pause of ten minutes in the morning spell increased the output by 8 per cent.; in assembling bicycle chains, a rest of five minutes every hour increased output by 13 per cent.; in folding handkerchiefs, a rest of seven minutes every hour increased output by 4 per cent.; in labelling, ten minutes' rest every hour increased output by 13 per cent. Many other similar results could without difficulty be quoted.

The type of rest taken is important. All types of change are beneficial, but some are more so than others, as we see from the following table, showing the results from an experiment in which the work was mental arithmetic, and the pause one of fifteen minutes.

TABLE 5

Type	Saving
Absolute rest	9·3 per cent.
Uncontrolled	8·5 ,,
Music (listening)	3·9 ,,
Tea	3·4 ,,
Walk	1·5 ,,

Pauses for rest, as may have been already deduced, are useless if introduced arbitrarily. Their duration, and the best time at which they are to be allowed, can only be determined after scientific investigation. Naturally, they will vary in duration, and in time of insertion, according to the kind of work engaged in, and the conditions of work. Consequently, they must be determined in every case individually.

The main effect on the work curve is, of course, that the fatigue is reduced. But a certain amount of practice effect is lost, varying in amount with the skill of the worker. There is also a loss in adaptation and in incitement, but a gain in the presence of a fresh initial spurt. If the pause is too short, it will not compensate for the loss in adaptation and in incitement; if it is too long, the practice effect may be largely eliminated and there will be an impairment in efficiency. Hence the *most favourable pause*, neither too long nor too short, must be determined by investigation in every case.

From a study of the work curve, after changed conditions of work, it is possible to draw conclusions as to

whether the change has been beneficial or otherwise.[1] This can be determined by the shape and the level of the work curve. In the first place, the curve may remain the same shape, but reach a higher level. This signifies that a greater output has been obtained under the new conditions, with the same amount of effort, and with the same fatigue. In the second place, the curve may continue practically on the same level, but be of a far better shape. This means not greater speed, but that the cumulative effects of fatigue are less marked. In the third place, the curve may be on a higher level, but of a worse shape. We may then assume that the increased output has resulted from a quicker and more fatiguing method of working. In the fourth place, the curve may be on a higher level and also of a better shape. This indicates speedier, easier, and less fatiguing methods of working, yielding a higher output with less fatigue to the worker.

MONOTONY

A claim has been made that a special form of work curve appears when the work is of a monotonous character. In appearance it may almost be described as the reverse of the ordinary work curve, so far as shape is concerned. The worker starts off fresh in the morning at his work, but as monotony begins to take effect, his speed of work slackens, and the output gradually drops lower and lower. It does not begin to rise again perhaps until he becomes aware that the time for cessation of work is drawing near. This is sufficient to act as an incentive, and his output increases, showing in the curve a gradual rise. The curve of monotonous work thus is like a valley with a sharp fall in the middle and high on either side. It is

[1] Myers: *Industrial Psychology in Great Britain*, pp. 68–9.

thus inverse to the ordinary work curve, which reaches its maximum peak in the middle and falls on either side. These ' monotony curves ' do not appear in all repetitive work, but are only characteristic of workers who thus express boredom with their work. One other feature of work curves, where the work is monotonous to the worker, is their variability. The work curve shows great fluctuations within short intervals, as one would expect with work which is not absorbing the worker's interest.

An interesting experiment on monotonous work was carried out in Manchester,[1] in which four girls were selected on the basis of intelligence tests from a school for unemployed young persons. Two of these, A and B, were ranked as very intelligent; one, C, as possessing average intelligence, and one, D, as possessing less than average intelligence. The repetitive work given them to do consisted of cross-stitching on canvas, the output being measured by the number of stitches done. The daily output records in most instances appeared as monotony curves with drops in output in the middle. Subject A, although the most intelligent of the four, only ranked second as regards output, although she was capable of high single scores. Her output during the last three weeks of the experiment was only 88 per cent. of C's. A felt restless and bored while doing the work. Subject B, who was also very intelligent, was even less efficient, her output being only 84 per cent. of C's. Like A, she was capable of high single scores, but seldom made them. At the end of the experiment, she confessed that she had found the work ' very tedious,' and would not like to do it regularly. Subject C proved to be the best worker of all.

[1] I. Burnett: " An Experimental Investigation into Repetitive Work," *Industrial Fatigue Research Board Report*, No. 30.

She did 12 per cent. more work than A, and stated she had not experienced any strain of monotony, but on the contrary had rather liked the repetitive work. Subject D, whose intelligence was less than normal, had also the smallest output. She made considerable progress, however, and her curve over the whole period showed a steady practice effect. She liked the work, did not find it monotonous, but would have preferred working by herself, as she found the presence of the other girls distracting.

Though only four girls were engaged in this investigation, the results suffice to show that the feeling of monotony depends, not so much on the work, as on the make-up of the worker. The amount of intelligence possessed, coupled with temperamental qualities, makes all the difference as to whether the work will be regarded as monotonous or otherwise. The well-known instance of the worker engaged all day in wrapping electric filament lamps in tissue paper is a case in point. A more monotonous job might be difficult to find. But it occasioned great surprise to the worker in question when it was suggested to her that her work was monotonous. She had never found it so. On the contrary, it had always appeared to her as possessing infinite variety, for sometimes she held the bulb this way, sometimes that way, sometimes she wrapped the tissue paper round one way, sometimes another way, and so on. The position may be aptly described in the words of the well-known proverb which is to the effect that "what is one man's meat may be another man's poison."

In work which is monotonous to the worker, serious attempts have been made to lessen the monotony by many devices. A change round of work at stated intervals has been tried or the worker has been made responsible for

more than one job. But in some cases a decrease in output has resulted, although in others there has been an increase. No hard-and-fast generalization can be made, as too much seems to depend on the nature of the work as well as on the individual concerned.

Other ways of reducing monotony have been considered. One is to introduce rest pauses, which, as one may suppose, will be a beneficial measure. The other is to introduce slight changes in method. Instead of facing the individual with an endless supply of material, for example, at the beginning of his work, attempts have been made to break this up into smaller units, one unit only being presented at a time, so that the completion of each unit of work will act as an incentive and stimulus. This has done much to dispel boredom in over-monotonous work.

TIME AND MOTION STUDY

Time and motion study may be described as a branch of industrial psychology which has developed out of investigations in laboratories into reaction time and fatigue. But it has made such strides in recent years that it is doubtful whether it now belongs to psychology at all, or whether it may more aptly belong to the field of the efficiency engineer. We are concerned with it in this chapter in so far as it helps in the elimination of fatigue by building up better work methods.

Time study, as its name suggests, is concerned with timing the work. Generally each element of the work is timed, and an endeavour is made to fix the time the task should take as a whole. Motion study or movement study is concerned with the movements to be made in the work, the ultimate aim being to dispense with those that

can be dispensed with—the unnecessary ones—and to improve those that are indispensable. 'Extensive' motion study not only studies the larger movements of the body, but is also interested in the arrangement of the work material, whereas 'intensive' motion study takes as its objective the smaller movements of the hands and fingers.

Time and motion study started very simply with the observation of different workmen. It was thought that the workmen who produced the greatest output must have the best methods of work. Their methods were, therefore, observed, analysed, timed by a stop-watch, and then explained to the other workmen. Later, the movements were photographed. A big advance of method was the introduction of the 'cyclegraph.' This comprised the exposure of a photographic plate during the movement of the worker on which was recorded the path of a small electric light attached to the fingers or some other part of the worker's body. While this gave a better record of the movement, there was no advance in technique in recording the time of the movement or the time of any part of the movement. The 'chronocyclegraph' thereupon made its appearance. This was a modification of the cyclegraph, so that the time taken by each movement, and the relative speed of each part, could be accurately recorded, as well as the direction of the movement. The first two were effected by cutting off the current at regular intervals, so that the record appeared, not as a continuous line, but as a series of dashes, each dash representing a known interval of time. The latter—the record of the direction of movement—was effected by cutting off the current gradually so that blunt arrow-heads took the place of the dashes—these pointing in the direc-

tion of the movements (Fig. 9). The employment of a stereoscopic camera to photograph the path of the light enables its movement to be seen in tri-dimensional space. If required, a wire model of the path of the movement can then be made, based on the record obtained from the chronocyclegraph. This wire model can be studied at leisure until the investigator discovers how the unnecessary movements can be eliminated, and the necessary movements combined in such a way as to be least productive of fatigue.

In addition, a process chart is sometimes constructed.

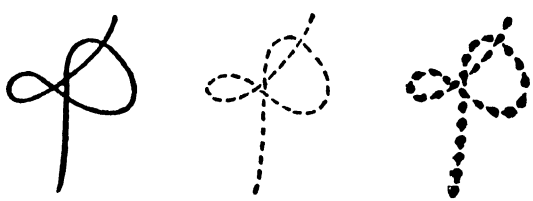

FIG. 9.

On this, every movement made by the worker and recorded by the chronocyclegraph is noted. The movements are then analysed into 'therbligs' (a name devised by their originator, Gilbreth) or basic elements, to each of which is attached a symbol. For example, the sign 0 may mean *search* (for a tool), ⌶ *find* (the tool), ⌒ *grasp* (the tool), etc. A chart is drawn up, coloured according to the symbol involved, the time taken for each operation being represented by the amount of space taken up on the chart. This final chart, as can be gathered, is of great use in the study of work movements.

The two names associated with time and motion study are F. W. Taylor and F. Gilbreth, two American investi-

gators. Taylor was the one who instituted time study. He divided up the work into its elements and timed each element separately. The times were then added together, to which was added a percentage for unavoidable delays—this total time became the standard time. Gilbreth, to obtain his standard time, timed various workers, and picked out from those the shortest times for each element or part of the work. These times were then added together to form the standard time, and the quickest movements of the different workers were combined together to form the standard movement.

The criticism urged against these two investigators and their disciples is that they judge results solely by speed. They insist, for example, on speed from the beginning with any new worker, even although this means erroneous work, their reason being that the path followed by a movement is different, when that movement is done quickly, as compared with the movement done slowly, and that with practice errors will gradually decrease. This doctrine of speed, and of 'the one best method,' is open to serious criticism, for it is very doubtful if any one method can be forced on every worker, as necessarily the best method.

To obtain the best results from time and motion study it is better to regard it, not as a means of increasing output, but, as already suggested, as a means of eliminating fatigue. From the beginning psychologists have been critical of the work of Gilbreth and his followers on the ground that they ignore fundamental physiological and psychological factors in human effort. These criticisms are well summarized by Farmer in one of the Industrial Fatigue Research Board Reports.[1] It is there pointed out that motion study ought to be regarded not from

[1] No. 14.

the point of view of speed, but from the point of view of the ease with which the workers can perform the movements. In most industrial processes there are three sets of movements: one set which is necessary for the performance of the work; a second set made necessary by the bad arrangement of tools perhaps, or due to the inexperience of the worker, which can be eliminated; a third set which is dependent on the individual rhythm of the worker. In other words, certain movements are necessary for the task but certain extra rhythmic movements may be allowed in order to suit the individual worker. The ideal, of course, is where no extra rhythmic movements need be put in, the necessary movements themselves being sufficiently rhythmic. On this basis Farmer conducted some investigations which are described in the same report. He attempted to arrange the task so that it would be in keeping with the natural rhythm of the worker. In other words, his goal might be said to have been rhythm rather than speed. In regard to time study, again it seems undesirable to set up a standard time as Taylor and Gilbreth have done. The best use of time study is to suggest improvements in the arrangement of the processes in the factory itself.

THE PSYCHOLOGICAL ASPECT OF ACCIDENTS

We have already discussed the indication of the presence of fatigue by measuring the output of the workers. Another measure is to count the number of accidents which occur in the course of the day. The 'accident curve' shows a gradual rise with length of time at work, indicating a close relationship between increase in fatigue and increase in number of accidents. The only decline in the accident curve is just towards the end of

the morning spell, and just towards the end of the afternoon spell, as the worker feels it will soon be time for him to down tools, or to cease work.

Accidents in industrial processes may arise from three sources. Some may be caused because of the lack of adequate safeguards on the machines in operation; others may be due to external factors over which the worker has no control, such as bad ventilation or bad illumination; while others may be due to factors in the worker himself, carelessness, inexperience, or characteristics of the worker which predispose him to accidents. Much has been done to prevent accidents by supplying machinery with safety guards, and by posters and appeals to workmen to exercise caution. Yet it has been calculated that an extraordinarily high percentage of accidents is still traceable to the human factor.

The first step in the scientific study of the mental causes of accidents has taken the form of an analysis of differences in susceptibility to accidents. It has been found that accidents are not due to carelessness on the part of some workers, but that some workers are, as we have seen, more 'prone to accidents' than others. It has been statistically shown that accidents do not distribute themselves by chance, but that they frequently happen to some workers, and not at all to others. These conclusions were reached by Greenwood and Woods in an investigation carried out for the Industrial Health Research Board.[1]

Marbe, a German investigator, on the basis of investigations conducted by himself, has actually formulated a law with respect to the susceptibility of certain individuals to accidents. His law is to the effect that "the probability that an individual will experience an accident can be

[1] Report No. 4.

determined from the number which he has already sustained." Marbe's investigations and the other investigation quoted above do not stand alone. They are supported by the results of many investigators working in this field. Viteles, in America, for example, studied the number of accidents of motormen in the transportation service.[1] He found quite definitely that accidents do not distribute themselves by chance, but that a small percentage of workers seem to be involved in many accidents, while a large proportion remain relatively free from accidents. He was given the names of one company of 100 motormen with good accident records, and 100 with exceptionally bad accident records. These were paired according to length of service, and he was able to obtain 54 pairs which ranged in length of service from one year to eleven years. He found that the 54 in the good record group had been involved in 57 accidents, whereas the 54 men in the bad record group had been involved in 784 accidents, about fourteen times as many.

Farmer and Chambers[2] have tried to devise tests which would measure this susceptibility to accidents or which would pick out 'accident-prone' individuals. Three groups of tests were tried out. Group 1, termed tests of 'æstheto-kinetic' co-ordination, included a dotting test, a test of reaction time, and a pursuit-meter test. This last is a delicate hand and eye co-ordination test. Group 2, tests of temperamental instability, included tests of muscular balance and of tremor. Group 3 tested intelligence. One of the most important results obtained was that those who ranked high on the æstheto-kinetic co-ordination tests had an average accident rate of 48 per cent. less

[1] *Industrial Psychology*, p. 374.

[2] *Industrial Health Research Board Report*, No. 38.

than those who ranked low. In a later investigation carried out by the same investigators [1] it was found that the lowest 25 per cent. in the combined intelligence and æsthetico-kinetic tests had an accident rate 2·5 times as great as the remaining 75 per cent. An extremely significant finding was that the correlation between the psychological tests and accident rates increases with increased length of exposure to risk of accident. This indicates the importance of early transfer to safer work of the individual liable to be involved in accidents. The authors are careful to point out, however, that their results suggest that susceptibility to accidents is not dependent on one single factor, but that many factors are probably involved.

THE HUMAN FACTOR IN INDUSTRIAL RELATIONS

It is only since the psychologist began to interest himself in problems of industry that emotional and temperamental conditions and factors, as affecting problems of the factory and the workshop, have had attention directed to them. Not only is the efficiency of work determined by the physical, sensory, intellectual, and motor characteristics and capacities of the individual worker, but the efficiency of industry as a whole, as well as the efficiency of the work of the individual, is largely determined by factors which are emotional and volitional—feeling and will, to use the Anglo-Saxon words—rather than physical, sensori-motor, or intellectual. The full significance in industrial life of this aspect of human nature has only been recognized in quite recent times, and the scientific study of the various practical problems involved has barely begun. At the same time it ought to be noted that many of

[1] Report No. 55.

the conclusions arrived at by general psychology in this field can be directly applied, and can be made to illumine industrial as well as practical life generally.

The study by psychologists and psychoanalysts of fundamental human motives has been assiduously pursued since the beginning of the present century. Much light has been thrown on the motives that must be taken into account in estimating the effect of incentives of all kinds, in seeking to develop *esprit de corps* and the ' team spirit,' in dealing with industrial disputes and unrest. It has been made abundantly clear that for the understanding of some of the wider and more important problems of industrial life a study of the human factor in industry from the emotional and volitional point of view is essential, and to a greater and greater extent the more complex the problems are.

Among the most important of these fundamental motives of the human being are : the instinct or impulse to acquire goods, property, or wealth, the impulse towards self-expression or self-display, sometimes spoken of as the desire for power or for prominence, the aggressive impulse, and the impulse to escape from dangerous or painful situations. The chief incentives in industry—not the only incentives by any means—depend on the operation of one or more of these impulses.

Among these motives practically the only one recognized by the older generation of industrialists and economists was the first, and it was recognized in the narrowest of senses. It obviously operates mainly in connexion with the earning by the worker of the wages or other rewards of his work, but its operation in such cases may be by no means so simple as is generally supposed. Desire for the things money will purchase may arise as frequently from

seeing other people in possession of certain things, as from the direct satisfaction which the possession of these things may be expected to yield. In this case the self impulses as well as the acquisitive impulses are obviously involved. Moreover, since loss of work involves loss of wages and a consequent threat of hardship or suffering to the worker himself or to those dear to him, an additional incentive may be derived from the impulse to escape.

Some experimental work on incentives has been done in the psychological laboratory, though it is impossible to duplicate under laboratory conditions either the variety, or the complexity, or the power of the incentives that operate in industrial life. These experiments, nevertheless, have a certain practical value. They show clearly the great influence that may be exerted by an incentive—even an artificial one. They can also be made to show the relative value of incentives subjected to different conditions, as, for example, an immediate reward, or a delayed reward, a reward a week hence or a month hence, and so on. Some factory investigations have also taken place in an attempt to evaluate the influence of different types of incentives, as rivalry and competition with other workers or with oneself, increase of wages, promotion, extra pay above the standard wages to be earned under certain conditions, profit-sharing, and so on.

It is not infrequently found that this or that incentive exercises merely a temporary influence on the efficiency of work in a factory or industrial undertaking. In such cases we must look for deeper factors which are counteracting the influence of the incentive. These deeper factors are usually aggressive or escape impulses operating beneath the surface, as it were, because of something

fundamentally wrong in the organization of the factory or other undertaking, or in the relations of the workers to the management, or to the foremen, or to one another.

The consideration of all the factors entering into the development of such situations would lead us too far. A rough outline, however, may be attempted. Aggressive and escape impulses are obviously both involved. Both tend very frequently to be evoked by the same situation, since anything that obstructs some desire or purpose tends to evoke aggression, and at the same time, if the thwarted desire is an intense one the obstruction is highly disagreeable, and so tends to evoke the impulse of avoidance or escape. Or, looking at matters from the other side, we may find a disagreeable situation evoking the escape impulse, from which the individual cannot escape, and to which he therefore reacts aggressively. The emotional state may be further complicated by the evoking of other fundamental impulses, such as the impulse towards self-expression, or the parental impulse, or both. For example, a worker may be compelled, by the urgent necessity of providing for his wife and children to work under a foreman, who is continually finding fault with him and his work, blocking his way to promotion, keeping him at work which appears to him the merest drudgery, and under constant fear of dismissal.

This is the kind of situation that produces what has been called ' emotional conflict,' from which in turn may arise the various phenomena of the unconscious to which so much attention has been given by certain psychologists in recent years. What may happen in such cases will depend on a variety of circumstances—the nature of the individual, the strength of the impulses involved, the means of escape

or aggression available. As it has been put in a recent book on industrial psychology, " one or other of the conflicting motives may have its way, but distorted in its operation by the presence of the other. If the escape impulse has its way the individual may escape by the flowery path of phantasy. His body is tied down to the uncongenial work, but his mind escapes into a realm where all his wishes are fulfilled and all his desires realized. Or he may be constantly on the look-out for an opportunity of changing his employment, becoming in consequence a very inefficient and unreliable workman, and possibly drifting about from one job to another. If, on the other hand, the aggressive impulse predominates, the aggression may be directed against relatively unimportant, or even more or less innocent, elements in the situation with a violence which is quite unintelligible unless we know all the facts. Frequently in this case the individual presents the well-known features of the 'man with a grievance,' who is always 'agin the government,' and who may cause a good deal of trouble, where circumstances favour the development of trouble." [1]

A word may be said in conclusion about the development of *esprit de corps* and the 'team spirit' in a body of workers. This involves conditions exactly opposite to those just considered. The importance of the 'team spirit,' from the point of view both of the happiness of the individual worker, and of the efficiency of the work, can hardly be overestimated. The problem is how to develop it. The essential condition is that the work should be in some way identified with the individual worker himself, so that he feels that the efficiency of the factory, let us say,

[1] *Industrial Psychology*, edited by Myers (Home University Library), p. 32.

and its reputation reflect upon *his* efficiency and *his* reputation. To satisfy this condition the best plan would appear to be to give the workers themselves a very considerable say in the organization of the work, and in the guidance generally of the policy of the industrial undertaking.

CHAPTER IX

PSYCHOLOGY AND ADVERTISING

ADVERTISING, with its appeals to human feeling and reasoning, and its attempts to influence human behaviour, has much to learn from psychology. In fact, many of its problems have been made the subject of psychological investigation. These investigations have not only yielded a certain amount of insight into the workings of the human mind to the psychologist, but they have been of great value to the advertiser. We can only indicate rather briefly in this chapter some of the lines these investigations have taken.

Any advertisement can be regarded from two points of view, the *appeal* which it makes, and the *response* which it evokes. The appeal is generally through the senses, and as we shall see presently, anything which will enhance the appeal will increase the likelihood of the success of the advertisement. The nature of the response desired will alter the form the advertisement takes. Every advertisement, of course, if a good advertisement, ought to evoke a response of some kind. Sometimes the advertiser wants his advertisement to produce an immediate result; at other times he wants the advertisement to linger in the memory, so that when the occasion arises, the name advertised will come into consciousness and lead to action of the kind he desires. Certain advertisements, therefore—those which want immediate action—use the 'short-circuit' appeal, which is generally of the display type, depending on the stimulating of the instincts

and of the emotions. Others, intended for delayed buying of the article, use the 'long-circuit' appeal, which generally uses reasoning and thought as its medium. The problem of which is to be preferred requires solution separately for each commodity—a problem which psychology has attempted in certain cases to solve.

Another general problem which psychology has tackled in this field is the classification of the different types of advertisement, and the nature of the commodity suitable for each. Advertisements are generally divided into three classes. The 'Classified' advertisement consists usually of a simple announcement intended for individuals already interested. It does not require therefore a prominent position. The 'Publicity' advertisement is one employed to keep the name of an article before the public, or to make a trade-name familiar, and is generally supplementary to some other advertisement. The 'Display' advertisement has a direct appeal, and is the substitute in advertising for the personal appeal of the salesman. Adams [1] has added to the above two other types. One he describes as the advertisement of the 'Competitive' type, in which it is assumed that the need for a commodity is fully realized, but more than one way may be available of supplying the need. The advertisement has accordingly to set out the outstanding qualities of its own commodity for this purpose. The other type of advertisement suggested by Adams is where the advertisement tries to make the public feel a new need, and then suggests a remedy for it. Very often such an advertisement has a social appeal such as that of self-improvement. The type of advertisement naturally varies according to the medium

[1] *Advertising and its Mental Laws.*

used, whether it be magazine or newspaper, trade journal or sign board.

Let us consider now the more fundamental principles on which a good advertisement should be based.

ATTRACTING THE ATTENTION

The first test of a good advertisement is that it should attract the attention—the spontaneous attention obviously—of the individual. All the information known to the psychologist about the psychology of attention is available to the advertiser. It behoves him therefore to consider most of the experimental data obtained, such as the extent of the span of attention, fluctuations that occur in the attentive process, and the like. The actual devices which assist in securing the attention are also of importance. These are generally divided into two classes termed 'mechanical' and 'interest' incentives respectively.

The main mechanical device lies in the intensity of the stimulus. The greater the intensity, the more likely is it to attract the attention. The ringing of a bell attracts attention to the announcement of the town-crier where he still exists. Similarly, very bright electric signs or gaily coloured posters, brighter and gayer than those around them, serve to attract the attention. These devices, unfortunately, soon lose in effect as the intensity cannot be increased indefinitely.

Another device very frequently employed is that of size. The bigger the advertisement, the larger the electric sign or poster, the more chance it has of fulfilling its purpose. Even in magazines or newspapers this holds good too, for the more space an advertisement takes up, the more chance it has of being noticed. One of the earliest experimenters in the field of advertising in-

vestigated this point by asking a number of individuals, about 500 in all, to look over a magazine casually, and at the end of ten minutes requesting them to write down all they remembered of the advertisements. The results from this and from other similar experimenters gave the finding that the whole page when filled with one advertisement was about twice as effective as the half-page, and the half-page twice as effective as the quarter-page, and so on.

This result, however, has not gone unchallenged, for if 'long-distance' memory value is taken into account, the order changes. Strong, for example, actually states his conclusions in the form of a law to the effect that "the value of space increases approximately as the square root of the increase in area, and not directly with the increase in area."[1] Accordingly, it seems more economical to insert a quarter-page advertisement four times, or a half-page twice, than a full-page advertisement once. This is also influenced, of course, by the interval of time that is allowed to elapse between each appearance of the advertisement.

Another mechanical device is that of movement. A moving object catches the eye more easily than a stationary one. Hence the value of changing signs in shop windows. Again such devices, though useful in attracting the attention, do not necessarily keep the attention focused for any period of time. Contrast is another device sometimes employed. It may be used to advantage in an advertisement or poster by having a striking difference between the foreground and the background, such as red on green or blue on yellow. Or the advertisement may be

[1] *Psychological Review*, 1914, vol. xxi, pp. 136–52, "The Effect of Size of Advertisements and Frequency of their Presentations."

so arranged that it takes up the centre of the space, and is surrounded by a neutral background. Its 'isolation' is sufficient to cause it to stand out. Black print surrounded by plenty of white space serves as an illustration of this device.

The best position for an advertisement has also been tested, at least with regard to its position on a page of newspaper or magazine. The eyes have certain fixation tendencies in reading, and because of these, certain positions on a page have better attention value than others. Starch by experiment determined that the value of the upper half of a page could be estimated at 61 per cent., whereas the value of the lower half of a page could only be assessed at 39 per cent. The left-hand upper part of a page seems to be the best position of all.

These mechanical devices, of which only a few have been indicated, all have a limited value, and advertisements which appeal to interests and instinctive tendencies seem to yield more stable and lasting results.

HOLDING THE ATTENTION

An advertisement, however, must do more than attract the attention if it is to be successful. The attraction of the attention is only the first stage which ought to lead naturally to the second stage, the *holding of the attention.* This, too, ought to be of sufficient duration to fix the advertisement in the memory. Various factors of diverse kinds have been tried for this end. The advertisement may contain 'shifting points' which will successively attract the attention, different styles, or different types of print, or arrows or lines. If the advertisement, too, is pleasing in its totality, there will be a desire to linger over it. It is natural to want to prolong what is pleasant

and to get away from what is unpleasant as quickly as possible. If an advertisement displeases because of its layout, or its crude colours, or its inappropriate illustrations, it is avoided, and the feeling of general discomfort and dislike becomes transferred to the article it advertises.

FIXING THE IMPRESSION

But the work of the advertisement is not completed, even if it attracts, and then holds the attention. To be a success, it must *fix the impression* so that when a need arises for a certain commodity, the special brand of the commodity advertised will come first to memory, and take precedence of all other similar commodities. One of the most powerful allies of the advertiser in bringing this about is repetition. An advertisement which appears before the public at intervals, by its sheer repetition alone, forces a way into consciousness, and becomes a powerful stimulus to action. Results obtained from experiments on the rate of forgetting have been utilized in this connexion. After material has been memorized, the rate of forgetting is very rapid at first, but proceeds more slowly afterwards. The larger proportion of the material is forgotten in the first day or so. In agreement with this law, Hollingworth suggests that advertisements should not be sent out at regular intervals of a week or so as is the customary procedure. But the second advertisement should appear two days after the issue of the first one, the third five days after that, the fourth ten days later, and the fifth twenty days later still. Posters probably score over other advertising media in that they are seen repeatedly. The same poster may, of course, fail to evoke interest after an interval of time, unless new features are added to it to maintain the attention.

Another important result obtained from studies of advertising arises from investigations centring round the laws of association of ideas. The so-called secondary laws of association, the laws of Recency, Frequency, Vividness, and Primacy, are of paramount importance. These, being interpreted, mean that advertisements seen recently are more apt to be recalled to memory, that advertisements seen frequently come easily to mind, that advertisements which make a vivid impression or a strong emotional appeal are easily remembered, that the first impression an advertisement makes may mean all the difference between success and failure—the proviso being added in all cases, other things being equal.

Two important findings with regard to the direction of our thinking are also of practical value in the sphere of advertising. The one is that we habitually think of the general, and then of the particular. We think of the genus tree and then of a particular tree, or we think of the genus soap and then of a special make of soap. The other finding is that it is easier to think in a forward direction than in a backward direction. The number five is more readily followed by six than it is by four, and so with most of our associations. In one experiment carried out in the University of Michigan, in which a comparison was made of forward and backward associations, the result was distinctly in favour of the former. A part of a list of a hundred words was composed of names of general classes such as 'fountain pens,' 'cameras,' 'soaps,' etc. The rest of the list was composed of specific names of commodities, in most cases trade names such as 'Kodak,' 'Remington,' etc. The list was read to the subject, and in each case he had to respond with the first word which occurred to him. The results showed that

the forward associations took 1·9 seconds, and the backward associations 2·36 seconds. These findings are violated more than any others in advertising. In advertising, the general class to which the article belongs should be mentioned first, followed by the particular article and then by its name. This order establishes a strong association between all three. Of course, where the article is well-known, the name generally becomes linked up with the article as if it were a compound word.

Other devices for fixing in the impression are illustrations, rhymes, catchy trade names, and other minor expedients. Or the device adopted by some advertisers, whereby the individual fills in a coupon and so receives a sample of the article, is also effective in impressing the memory.

EVOKING A RESPONSE

Finally, the fourth test of a good advertisement, and the only essential one, is its ability to *evoke a response*. If it fails to achieve this, the other three factors are of little avail. One of the most potent weapons in the hands of the advertiser is suggestion.[1] The repeated suggestion that a commodity possesses certain qualities leads to the belief that these qualities actually exist. Suggestion is also employed in advertisements which associate eminent people with particular commodities. It is a way of adding prestige to an advertisement. Prestige is a very curious and interesting psychological phenomenon. It is not very easily defined except in terms of the results produced. Prestige throws us into a receptive attitude towards the person or thing that has prestige. The prestige that operates in ordinary life may be due to all

[1] See Chapter IX.

kinds of things—reputation, wealth, rank, character, learning, even fine clothes, or superior size and strength. Not all of them can be utilized in advertising, but that advertisers are awake to the advantages of prestige is made clear by the numerous attempts to utilize its various forms. Thus an old-established firm has a prestige deriving from the fact that it is an old-established firm, and it is very seldom that this prestige is not exploited.

There are certain practical laws which must be obeyed if suggestion is to be made effective in influencing the actions of other people. Three such laws may be formulated. The first may be put in this way: Suggestion tends to operate in a positive rather than in a negative direction. This does not mean that the negative is a weak suggestion, but that it frequently causes the suggestion to operate in the opposite direction. The reason is, of course, that it compels us to think of that which is negatived. A second important law is that a suggestion has greater force in proportion as it appears to come from the individual himself. A suggestion that is recognized as coming from without may arouse resistance more or less instinctively, whereas if it appears to originate in the individual's own mind, this resistance will not arise. Current advertising recognizes this law in two ways. The first is by giving what may be called 'news interest' to the advertisement. It appears simply as useful information. The other method is by varying the manner of appeal in such a way that the particular source of any suggestion becomes more or less obscured, and a suggestion is left which cannot be identified as coming from anywhere in particular, which is so familiar that it seems to have been with us all our lives, and the action therefore to which it prompts seems our own idea and plan.

The third important law is that the suggestion must be specific and straightforward. It must not be in the nature of an appeal to relatively indeterminate and general feelings and interests such as patriotism, fashion, the avoidance of substitutes, if it is possible to appeal by relevant statements with regard to specific characteristics of an article. Further, it must not be of such a kind as to suggest rival ideas, as by inviting comparisons or the like. Such side issues merely impede the action of the suggestion, and so far as they involve an appeal to the 'reason why' they make the appeal a long-circuit appeal in place of a short-circuit appeal. This really involves defeat of the original purpose of the suggestion. Suggestion may, of course, be employed to influence the conclusions arrived at in a process of reasoning, but if the aim is to induce belief or action immediately, the initiating of a process of reasoning must be avoided.

Any lack of confidence also in the making of a statement, its qualifications, and the like, will weaken its suggestive force. The effect of this is obviously to produce hesitation, and that is fatal to the short-circuit appeal, and to the long-circuit appeal also so far as that is dependent on suggestion.

These laws are all of the utmost importance practically, and an examination of the advertisements in any magazine will soon show us how far they are usually obeyed and how far violated. It may safely be said that the violation of any one of them produces a poor advertisement.

A new form of advertising has emerged of late years in the form of radio advertising. This has some undoubted advantages, since it substitutes for the impersonal advertisement the voice with its personal appeal. Further, it

secures a wide public, for it can penetrate right into the home, and command attention there. The custom of interspersing advertisements with musical items means too that the attention is assured, and that the feeling-tone associated with the musical programme may be linked up through association with the article advertised. If the musical programme is enjoyed, the pleasing tone accompaying its reception reacts beneficially on the advertised goods. If, however, as may be the case, irritation is felt at the constant interruption of a programme in order that the virtue of a certain article be narrated, the radio advertisement will suffer. If the programme, further, be not pleasing, or if the announcer's voice is raucous, an adverse effect on the reception of the advertisement will be inevitable. This new form of advertising, therefore, although in some respects highly advantageous, has numerous pitfalls, sometimes difficult to avoid, and presents psychological problems which are still to a large extent unsolved.

PSYCHOLOGY AND SALESMANSHIP

Salesmanship, though closely akin to advertising, is more difficult to investigate. The act of selling can also be considered as presenting two aspects—the *appeal* of the salesman, and the *response* of the purchaser. But in this field it is more difficult to generalize, for each act of selling constitutes a separate problem. A knowledge of human nature and of the laws governing human behaviour seems to be essential for the successful salesman. Psychology has attempted to analyse the complete act of selling into its constituent elements, such as the best way of approaching the customer, how to present the merits of the article to be sold, the ' argument ' between customer and sales-

man, and so on. Psychology has also shown that one of the most potent factors in salesmanship is suggestion. The salesman, in fact, has to suggest the merits of the commodity he is trying to sell, and to break up counter-suggestions on the part of the would-be purchaser. This process naturally varies with the type of customer, so that a salesman needs to possess not only an insight into individual differences, but also considerable tact, and a fair amount of self-confidence.

Two danger zones in selling have been drawn attention to—the opening of an interview and the closing of the interview. It is essential to gain a favourable opening, otherwise no progress is possible, and, in fact, the matter may speedily end, if a direct negative attitude arises on the part of the individual interviewed. Skilful handling of the situation is often essential to get interest aroused, and much depends on the personality of the salesman and the atmosphere he creates. The closing of the interview also requires skill if it is to terminate favourably. Hesitation at the critical moment on the part of the salesman may prevent a sale, or wrong words or action may have the same effect. The decision to buy may be shown by a sudden tenseness, or a change in facial expression, or an almost imperceptible movement, and the salesman must be quick in reinforcing this decision by some suitable remark or action on his part.

Crane[1] in illustration of the above points gives an apt example of an actual incident which took place in the selling of cheque-writing machines. The salesman presented his case so successfully that the buyer said he would give an order. When asked 'how many,' he replied 'Thirty-five.' The salesman was expecting an order for

[1] *Psychology Applied*, p. 175.

one or two, and he became so excited over this large order that he could hardly fill in the order form. His excitement was very noticeable, and caused the buyer to say that he wanted, however, to think it over. Next day he gave the order to another salesman, the reason being that he felt that the first salesman was not accustomed to large orders, and therefore drew the conclusion that 'his machine wasn't any good.'

The whole art of salesmanship is a study of personalities, the personality of the salesman, the personality of the purchaser, and their reaction the one to the other.[1]

[1] For a fuller discussion, consult any of the books on psychology and salesmanship so numerous in the market.

CHAPTER X

PSYCHOLOGY AND HEALTH

A COMMON obstacle to scientific progress has always been the tendency on the part of the ordinary man to look to immediately practical ends, and to be interested in them to the neglect of fundamental principles. Popular science almost always exhibits this tendency, for the scientist is not always above pandering to the desires of the crowd. At the same time, and largely because of this, popular science frequently suffers from a tendency to substitute the offspring of the fancy for that of the reason, in the explanation of facts bearing directly upon important practical issues, especially when the offspring of the fancy is more attractive or more sensational. The history of popular pseudo-scientific beliefs offers abundance of illustrative material. Alchemy, astrology, phrenology, mesmerism, all tell the same tale. In every age of the world's history the genuinely scientific outlook has been in conflict with what we may call the magical, sometimes in one field of human inquiry, sometimes in another. At the present time this conflict is raging most fiercely in the field of psychology, and more particularly in that part of the field which falls to be discussed in the present chapter.

What is known as ' psychotherapy '—that is, the treatment of bodily disease and mental disorder by mental rather than material means—is an important and comparatively recent development of applied psychology. The treatment of bodily disease by mental means appears

to have its roots, as Rivers has pointed out,[1] far back in the earliest stages of human culture—as indeed has medicine itself. Not that primitive man has any clear conception of mind itself, or of the mental phenomena involved. That has only come in comparatively recent times. Nevertheless, there is no difficulty in tracing 'faith healing,' as we now call it, through practically all stages of culture back to the most primitive.

The phenomena of 'faith healing' and associated phenomena, though known to practically every age and in practically every country and people, have only been scientifically studied during the last hundred years or so. This scientific study may be said to have begun with Mesmer, though it is difficult to regard Mesmer himself as a scientifically minded man. Mesmer was born in 1754 and graduated in medicine at Vienna in 1776. His doctor's thesis was on: "The Influence of Planets on the Human Body," and might be said to represent an attempt to revive astrology from a medical point of view. This early interest, however, was later displaced by an interest in the phenomena which he believed to be produced by what he called 'animal magnetism.' He found that under the influence of 'animal magnetism' a number of very striking phenomena appeared—paralyses, anæsthesias, hallucinations, and the like. Diseases, he found, could also be cured. In his opinion the operating influence in all cases was an invisible magnetic fluid, which passed from the operator to the subject. The operator could also, he contended, magnetize material objects in such a way that the same influence could also be exerted by them.

Mesmer migrated to Paris in 1778, and there he appealed to the French Academy of Sciences and to the

[1] *Mind and Medicine*, John Ryland's Lecture, 1919.

Royal Medical Society for acceptance and confirmation of his theory of 'animal magnetism.' The decision went against him, but later—in 1784—a Commission of the Faculty of Medicine was appointed to consider the phenomena, and Mesmer's theory of their mode of production. The theory was again rejected. By this time scientific interest had been widely aroused, and investigations were actively proceeding in various countries, while new theories, some of them of the wildest descriptions, were continually being put forward. The credit of first giving something like a scientific explanation of the phenomena belongs to James Braid, a Manchester physician. Braid held that the phenomena were due to a condition of the nervous system, more or less analogous to the condition in sleep, and he used the term 'hypnosis' to designate this condition. From the time of Braid, about 1840, onwards the magnetic fluid theory ceased to be regarded as a scientific theory, and it has few adherents nowadays, except among the ignorant.

As regards the phenomena of hypnosis, a long controversy has raged in France between the school of Paris and the school of Nancy. Psychologists of the Paris school have taken the view that in the hypnotic condition we have present an abnormal state of the nervous system, that the hypnotic condition, to use technical language, is an artificially produced neurosis or nervous disorder. Psychologists of the Nancy school, on the other hand, have held that the hypnotic condition is nothing more than a condition of exaggerated suggestibility artificially induced, and that all the phenomena, even the most unusual and bizarre, can be explained in terms of suggestion and suggestibility.

SUGGESTION AND SUGGESTIBILITY

Before we go farther, some account must be given of suggestion and its operation. Suggestion, as used by present-day psychologists, may be defined as a mental process which results in the uncritical acceptance of ideas conveyed by the words, attitudes, or acts of other people, and the automatic or semi-reflex realization of these ideas in act, belief, or even perception. Although this definition covers most of the phenomena, there are phenomena which appear to be of essentially the same order, that are scarcely covered. Thus the definition assumes that the suggested idea must come from another person. The idea which realizes itself automatically, however, may be one that arises in our own minds, and is not communicated from without at all. To mark this difference we use the term 'auto-suggestion' of such cases, as opposed to 'hetero-suggestion,' when the suggestion comes from another person. Moreover, the idea that realizes itself in this way may in some cases come to us from the perceiving of an inanimate object, especially an object to which we habitually react in a definite way, as, for example, a chair, which may suggest sitting down to us.

The factors upon which the efficacy of suggestion depends may be either objective, i.e. external to the individual who receives the suggestion, or subjective. Anything that gives impressiveness to a suggested idea will favour its acceptance, such as the manner in which the suggestion is conveyed, or the source from which it comes. The latter is particularly important. The prestige which an individual possesses, either because of his personal qualities, his reputation, his profession, or his wealth, must be regarded as a factor of the first importance with

reference to the influence he exerts through suggestion on the lives and actions of his fellow-men. The subjective factors determine what we call a person's suggestibility. Some people are naturally and congenitally more suggestible than others. Natural suggestibility is enhanced by certain conditions, as, for example, youth and inexperience, lack of knowledge, fatigue, illness, the influence of drugs. In the states generally grouped together as 'hypnoidal'—the state between sleep and waking, sleep itself, hypnosis—suggestibility is very high, as also in the nervous disorder known as hysteria.

Under favourable circumstances a wide range of phenomena can be produced by suggestion. The full range is best understood by considering the phenomena producible by suggestion in hypnosis. It ought to be remembered, however, that with good subjects, and in hysteria cases, all the phenomena may be produced without any at least deliberate hypnosis. The phenomena can be grouped under four heads: (1) phenomena involving control of the voluntary musculature, (2) phenomena involving control of the senses and the memory, (3) phenomena involving the involuntary muscles and glands, (4) phenomena involving structural or organic changes. These may be considered briefly in turn.

1. *Phenomena involving Control of the Voluntary Musculature.*—It is well known that the acts of a person in hypnosis can be controlled by the operator through suggestion, but the extent of the control that can be exercised is seldom realized. Within certain limits the hypnotized subject acts entirely in accordance with the suggestions of the operator. The limits are wider in proportion as the hypnosis is deeper, but it is very

doubtful whether the hypnotized subject can ever be made by suggestion to act contrary to strongly established principles of conduct, unless after a long period of preparation. The subject may also be inhibited from acting as he desires to act. That is, his arms or legs or speech organs may be paralysed by suggestion. He may, for example, be told by the operator that he cannot sign his name, and when he tries, rigidity of the hand muscles can be suggested by the mere attitude of the operator, so that he is unable to form the letters.[1]

2. *Phenomena involving Control of the Senses and the Memory.*—Hallucinations, both positive and negative, can be readily produced by suggestion. By a positive hallucination is meant the perceiving of something when there is no stimulation of the sense organs from without, as when a person or object is seen, or a voice heard, when no person, object, or sound is there. By a negative hallucination, on the other hand, is meant failure to perceive something when it is actually stimulating the appropriate sense organ. The most interesting case of negative hallucination, and the case which is of greatest practical importance, is the suppression of pain by suggestion. Hypnotic suggestion has indeed been employed to produce anæsthesia for purposes of surgical operation. The mother who kisses away the hurt a child has received from a fall is using suggestion in a similar way.

In an analogous way the memories of the hypnotized subject may be controlled. He may be made by suggestion to recall what has been long forgotten, such as experiences of early childhood, or he may be made to forget the most familiar things, such as his own age or his own

[1] See for good illustration, Sidis: *Psychology of Suggestion.*

name. He may be given false memories, as, for example, a name, or an age, or a nationality, which is not his own. In the last case a very interesting phenomenon is frequently observed. The subject elaborates on the false memories suggested, and may build up a whole self-consistent system of imaginary memories round them in a most striking way. An analogous phenomenon to this last, though on a less complex and elaborate scale, occurs sometimes when hallucinations are suggested.

3. *Phenomena involving the Involuntary Muscles and Glands.*—We now come to phenomena which are rarer and more difficult to understand. The involuntary muscles compose the walls of the internal organs, the blood-vessels, and the intestines. Ordinarily, as their name indicates they are quite beyond the control of the individual's will. Yet the evidence is quite conclusive that in favourable circumstances and with good subjects they can be affected by suggestion. The same holds of the glands of the body. Recent experimental work on the emotions, particularly the work of Cannon, as also to some extent the work of Pavlov and his followers, indicates the direction in which explanation of the phenomena is to be sought. By suggesting emotions, indeed, the accompanying and characteristic bodily changes, which involve phenomena of the involuntary muscles and glands, are easily produced, but some of the phenomena may apparently be produced directly through suggestion without the production of the emotional state.[1] In any case, the fact is undoubted that the production of changes in the digestive processes, the heart beat, the action of the sweat glands, and the like, can be brought about by suggestion.

[1] Again for illustrations, see Sidis : *op. cit.*

4. *Phenomena involving Structural or Organic Changes.*— This group of phenomena must be treated with the utmost caution. The frank incredulity which is often expressed with regard to such phenomena may well be pardoned, since nothing that we know concerning the physiology of the body tissues can in the least explain how structural changes can be produced by suggesting to the subject the idea of these changes. Nevertheless, all through history cases have been recorded of such phenomena. In a remarkable French work, *Les Miracles de la Volonté*, by Duchatel and Warcollier, a great number of such cases are recorded, and although the authors have been rather undiscriminating, the evidence in many cases is quite satisfactory. We must, therefore, be careful about denying the possibility of phenomena, such as the production of the marks on hands and feet of the nails on the hands and feet of the crucified Christ, of blisters on the skin, etc., by means of suggestion, because we cannot understand them.

These four groups of phenomena indicate clearly the wide range of the influence that can be exerted by suggestion. To the possible objection that they are phenomena of hypnosis rather than suggestion, the reply is that all the phenomena may show themselves, as already indicated, where there has been no attempt at hypnosis, at least on the part of another person. Of course, this does not exclude the possibility of the person having hypnotized himself, or at least brought himself into a condition analogous to the hypnotic condition, but that again could only have been brought about by auto-suggestion.

DISSOCIATION

Before going on to consider the practical bearing of all this, which seems to a large extent an excursion into abnormal psychology, we must consider briefly the phenomena of what has been called 'dissociation.' These phenomena apparently explain to a considerable extent the phenomena of suggestion, and also allied phenomena which must presently be discussed.

We get the clearest idea of the nature of dissociation when we regard it as a condition resulting from the blocking of connecting paths in the nervous system, though the scientific accuracy of this way of representing the facts may well be challenged. During the Great War many cases were met with of what was known as 'shell shock.' The sufferers, though there was no discoverable injury of the organs of hearing or speech, or of the brain itself, were frequently found to be apparently deaf and dumb, and to have no memory of the events immediately preceding the onset of the condition. The only way of accounting for the facts was by supposing that connecting paths in the nervous system, which were normally open, had been interrupted by the events causing the condition. The individual was deaf, not because of any injury to his organ of hearing, but because the connexion between sense organ and cortical seat of consciousness—to continue to speak in physiological terms—was interrupted or blocked. Similarly of the dumbness. The individual was unable to speak, not because the speech organs were injured, but because he was no longer in touch with, and in control of, his speech organs. That there was both hearing and speech could usually be proved by hypnotizing the individual, when

he could be got to hear and speak perfectly. So also of memory. The individual could not remember because the personality was no longer in touch with his memories, owing, as before, to the blocking of connecting paths. That there were memories could also be shown in the hypnotic state.

Three main types of dissociation may be distinguished. The first may be called *emotional* dissociation. It is characteristic of violent emotion that the individual becomes more or less blind and deaf to everything that is not relevant to the emotional state, or rather to its impulse and object. It is well known that serious wounds may be inflicted on a person who is in the heat of passion, without his being aware of them. The second is *hypnoidal* dissociation. This is best illustrated by sleep. Sleep is usually regarded as a state of unconsciousness. It can easily be shown, however, that even in sleep, though the individual may be unconscious in a superficial and popular sense, there are present phenomena which can only be described as conscious phenomena. Sleep, indeed, is best regarded as a state of widespread dissociation. So also is the state of hypnosis, as well as the state between sleep and waking, and similar states induced by drugs. The third may be called *traumatic* dissociation. In this case the dissociation is induced by an injury or shock, physical or mental. An illustration of the production of dissociation by a physical shock is concussion. In concussion the patient has no memory of the accident itself, which caused the concussion, nor usually of immediately preceding events. Mental shock produces somewhat similar effects.

The importance of an understanding of the phenomena of dissociation lies, not only in the fact that it enables us

to give some sort of reasonable, if rather hypothetical, explanation of the phenomena of hypnosis, but also in the fact that it may guide us in the treatment of nervous disorders of various degrees of gravity. It is because of dissociation that an individual is suggestible, and the degree of suggestibility would seem to vary with the extent of the dissociation. The more unusual phenomena of suggestion, also, become to some extent intelligible in the light of what we know of dissociation, or at least more intelligible than they would otherwise be. And finally many of the disorders which may be treated by suggestion, with or without hypnosis, can in some measure be explained as phenomena of dissociation.

PRACTICAL APPLICATIONS OF SUGGESTION

The employment of hypnosis to obtain anæsthesia for surgical operations has already been alluded to. Considerable use was made of hypnosis in this way before the real nature of the condition was understood, though not without much controversy as regards its usefulness, and not without considerable resistance on the part of the medical profession. These controversies, however, resulted in attention being called to the therapeutic value of hypnotic suggestion in other directions. Liébeault's *Du Sommeil*, published in 1866, represents the pioneer work in the direction of this wider application. Liébeault's views were at first ridiculed, but when Charcot, in Paris, and Bernheim, in Nancy, followed in his footsteps ridicule was quickly changed into widespread interest. The representatives of both the Paris and the Nancy schools, in spite of their acute disagreement on theoretical questions, both came to employ hypnotic suggestion and also simple suggestion without hypnosis

in the treatment of various nervous and mental disorders, and even in the treatment of disorders which at first sight seem physical rather than mental.

The methods of producing the hypnotic state are exceedingly various. An essential condition, at least to begin with, is that the subject should yield himself to the suggestions of the operator. Superior strength of will in the operator has nothing to do with it. The initial step lies with the subject, who might be said in a certain sense to hypnotize himself. In the case of autohypnosis, or self-hypnosis, indeed, there is no operator present at all, the subject himself producing the hypnotic state in himself. In all cases it appears to be essential that the subject should first of all concentrate his attention on the idea of sleep, the mind being, as it were, emptied of all other ideas. In Braid's method the attainment of this condition is facilitated by the subject's fixation of a small, bright object, placed so as to produce some slight strain of the eyes in looking at it. In other methods, Richet's, for example, great stress is laid on making passes with the hands from the top of the subject's head downwards. In still others the suggestion of sleep, conveyed to the subject in a slow monotone, is employed. "Now your eyes are beginning to close; your eyes are growing more and more fatigued; the lids quiver more and more. You feel tired all over; your arms go to sleep; your legs grow tired; a feeling of heaviness and the desire for sleep take possession of your whole body. Your eyes close; your head feels duller; your thoughts grow more and more confused. Now you can no longer resist; now your eyelids are closed. Sleep!"[1] This last is the method of the Nancy school.

[1] Moll: *Hypnotism*, p. 23.

Any one of these methods may often be successfully used to induce sleep in a sleepless child or adult, either by the individual himself or by another. When they are used to produce hypnosis the operator keeps in touch with the subject by means of his voice, and so prevents the supervention of sleep. In the case of subjects who have been frequently hypnotized, the condition may occur with great facility, a mere gesture or word on the part of the operator being frequently sufficient. The phenomena, indeed, in this case approximate to those of what is called a ' conditioned response.'

While, as Rivers has pointed out,[1] " the action of suggestion can never be excluded in any form of medical treatment, whether it be explicitly designed to act upon the mind, or whether ostensibly it is purely physical in character," there are undoubtedly serious difficulties and dangers attending the extensive employment of hypnotic suggestion. On the one hand it tends to make the patient rely on an outside agency, and to lose his own self-reliance, sometimes to a dangerous extent. On the other hand, it may remove one symptom only for another, possibly more serious, symptom to take its place, especially in cases where both patient and physician are unaware of the deeper causes producing the symptoms. Though the dangers of hypnotism have probably been exaggerated by popular writers, they are unquestionably sufficiently serious to forbid our playing with the phenomena of hypnotic suggestion in the way that has frequently been done. Hypnotic suggestion should not be employed except by a physician, and a physician who has more than a tincture of psychology. The chief dangers are really those arising from that increased tendency to

[1] Rivers: *Op. cit.*

hypnosis which usually comes from being frequently hypnotized. This danger can to some extent be averted by counter-suggestions given to the subject when in hypnosis.

After what has been said the enormously important rôle which suggestion may play in medical practice is obvious. There is no need to labour the point. Various methods of psychotherapy are based on the deliberate employment of suggestion, with or without hypnosis. But, apart from these, the attitude taken up by the physician, his manner of speech, as well as the words he utters, may exercise tremendous influence on the patient, and expedite or retard his recovery. The same, of course, may be true of all those with whom the patient comes in contact, nurses, friends, relatives, but the suggestions from the physician have greater efficacy in so far as his prestige is greater. All this is coming to be more and more clearly recognized in modern medicine.

Though our discussion has for the most part implied suggestion from without—heterosuggestion—it must be remembered that under certain conditions, ideas arising in the mind of the subject without this external agency, at least directly, may be effective in precisely the same way, in which case we speak of 'auto-suggestion.' Some writers of the Nancy school have maintained that auto-suggestion is the fundamental type of suggestion. This is, however, a theoretical question into which we cannot enter at present. What is certain is that the phenomena of auto-suggestion are real and important, and that a patient's own attitude may by auto-suggestion powerfully affect the course of his illness. In neurotic patients particularly the influence of auto-suggestion may be very great. In fact, in these cases almost the complete range

of phenomena, as described above, may be realized, a great variety of symptoms thus finding an explanation in auto-suggestion. As such symptoms are produced by suggestion they may often be removed by similar means, but unfortunately, as we have already pointed out, if the underlying causes of the neurotic state are not removed, new symptoms may appear when the old disappear.

PSYCHOANALYSIS

We must now consider an important development arising out of the work on hypnotism of the French psychopathologists. One of Charcot's pupils soon abandoned both his point of view and his methods, and proceeded to found a school of psychopathology and psychiatry, which at the present time overshadows that of his master. This was Freud, who studied under Charcot for about a year—1885–6—and was at first greatly impressed by Charcot's employment of hypnosis in the treatment of hysteria. After his return to Vienna, however, disappointed with the results obtained in practice by employing Charcot's methods, and attracted by a new treatment of hysteria, which was being tried by a friend of his, Josef Breuer, he ultimately discontinued the use of hypnosis altogether in favour of the method of treatment we now know as psychoanalysis.

It is perhaps scarcely legitimate to class psychoanalysis under the head of applied psychology. It does not represent the application to practical problems of life of facts, laws, and methods discovered and developed by the psychologist pursuing his study as a pure science, except to a relatively insignificant extent. Historically psychoanalysis as a psychology—and a very unusual and unorthodox psychology it is—has developed out of

the practice of the psychiatrist as a medical practitioner. In this case an applied psychology has contributed to a pure psychology, and not arisen out of it, and to a less extent this is true also of the practical employment of hypnotic suggestion. Psychoanalysis is primarily a practice. As the word signifies, it is an analysis of the mind, or 'psyche,' and the object of this analysis is the diagnosis and treatment of nervous disorders.

Although psychoanalysis, with its various offshoots, owes its origin to Freud, it must not be forgotten that a direct development of the theories and practice of Charcot was going on simultaneously with Freud's development of his psychoanalytical theories and practice. Janet in France and Morton Prince in America employed hypnotic suggestion with some success in the treatment of nervous disorders of various kinds. Both found that in hypnosis forgotten experiences, which threw light upon the particular disorder, could be recalled, and that suggestions given in hypnosis could often be made effective in curing the disorder. Freud at first worked along similar lines in Vienna. As we have seen, however, he was not satisfied with the results obtained. He found that he could not hypnotize some of his neurotic patients, and in other cases, even where hypnosis could be induced, suggestion did not appear capable of effecting a cure. Breuer was at this time using a method of treatment, in which, in place of suggestions being given to the patient in hypnosis, he was encouraged to talk about his emotional experiences and difficulties, the function of the hypnosis being simply to get at experiences which were forgotten in normal waking life. Breuer's work represents the starting-point of the psychoanalytic method, and shows clearly where and how it diverged from the methods

employed by Charcot, Janet, and Morton Prince. Freud, dissatisfied with Charcot's methods, adopted those of Breuer, and for some time the two worked together. The psychological processes involved were spoken of as 'abreaction.' The theory underlying the methods was that 'bottled-up' emotions were allowed to find expression by the treatment, the source of the nervous disorder being thus removed.

While Breuer and Freud worked together hypnosis was retained as part of the treatment. Breuer, however, convinced from his own experience that the method involved very grave danger of women patients falling in love with the physician, abandoned the method, and left Freud, who was apparently made of sterner stuff, though he had the same kind of experiences as Breuer had, to carry on the work alone. This phenomenon of the patient falling in love with the physician, which both these psychiatrists had come upon, was found to be a more or less constant characteristic of the treatment, and a necessary stage on the way to a successful issue. It was spoken of as 'transference,' and the method of breaking the 'transference' for a long time presented a problem to Freud. When Freud was left alone he soon discontinued hypnosis in the belief that it was quite unnecessary, and the psychoanalytic method as we know it thus came into existence.

In practice psychoanalysis is an application of the experimental method of free association. With Freud and his followers dream analysis and interpretation came to take a prominent place in the method of procedure adopted. In using the method of free association the patient was told to fix his mind upon some item in his dream, and then to give his ideas as they came, without attempting to exercise any control, and without keeping

anything back. This is the method known in the laboratory as 'continuous free association.' Adler and Jung, who early broke away from the orthodox psychoanalytic doctrine, and developed each his own variety of analytic theory, also employ free association, and both agree with Freud in regarding the interpretation of dreams as important.

This is no place to discuss psychoanalytical theories in their different varieties, but nevertheless a brief summary of the main doctrines of the leaders is essential. The fundamental postulates of the Freudian theory are: (1) that everything in the mental life is causally determined, just as are all events in the physical universe, and (2) that the inner reality of mind—the unconscious—is to be conceived as psychical energy existing in the form of 'wishes' or trends. Freud's doctrine of the Unconscious—'unconscious' takes the place in Freudian psychology of the 'subconscious' of the French psychopathologists—is strongly coloured with the philosophical doctrines of Schopenhauer and von Hartmann, and has become increasingly so as time has gone on. With its metaphysical implications we are not concerned. Practically the 'wishes' or trends in the unconscious are for Freud the motive forces underlying the symptoms of nervous disorders, as also the course taken by dreams, causing forgettings, slips of tongue and pen, and similar happenings usually regarded as due merely to chance or accident, and underlying most of the thought and action of abnormal and normal alike. Among these 'wishes' and trends those expressive of the sex life are of predominant significance in explaining nervous disorders like hysteria. Freud is here merely giving utterance to views already enshrined in the word 'hysteria' itself—Greek ὑστέρα =

womb—and also developing a remark he once heard Charcot make, that some trouble in the sex life of the individual always underlies nervous disorder.

Since the present is always the outcome of what has happened in the past, and the experiences of the past, laid bare in psychoanalysis, go back to early childhood, Freud was led by his facts to formulate his characteristic theory that the nervous disorder of the present has its roots in the sex life of the young child. Freud and his followers indeed paint a very lurid picture of the child's early life, a picture that many people find to be grossly exaggerated. It is in consequence of this aspect of his theory that Freud's psychology, whether justly or not, has been somewhat violently reacted to by the popular mind. In the popular mind psychoanalysis and the doctrine of infantile sexuality have become identified.

Adler, who started as a disciple of Freud, parted from his master on this doctrine of the predominance of sexuality as a determinant of nervous disorder. For him the fundamental cause of nervous disorder is a feeling of inferiority. This becomes the fundamental cause of nervous disorder for the simple reason that the fundamental and predominant impulse in every human being is towards superiority. That is to say, Adler substitutes the 'wish for power' for Freud's sex impulse, and seeks to explain not merely nervous disorders, but human behaviour generally, on that basis, as Freud has sought to explain them on the basis of sexuality. Adler has designated his particular type of psychoanalytic theory 'Individual Psychology.'

Jung was also an early follower of Freud. His reason for abandoning the orthodox doctrines of psychoanalysis was similar to that of Adler, but went rather deeper. According to Jung's view Freud's emphasis on sexuality,

and particularly on infantile sexuality, leads to a one-sided and distorted view of human motives, of nervous disorders, and of the nature of dreams. The life energy is wider than sex. Nervous disorder, it seems to Jung, is due to failure to meet some situation in the present, and the real and important significance of dreams is with reference to present problems. In short, his emphasis is always on the present problems of the individual, rather than on his past experiences. His system of psychology he entitles 'Analytical Psychology.'

This is of course a totally inadequate account of the theories of these three representatives of the psycho-analytic movement as a whole. It will, however, serve to make clear in some measure the manner in which each seeks to understand nervous disorders and neurotic symptoms. Both Freud and Jung emphasize the importance of the 'wishes' or trends deep down in the individual's nature, and the fact that they are unconscious, and operate unconsciously; Adler does not emphasize their unconscious character to anything like the same extent.

Nervous disorders are for Freud the expression of 'wishes' or trends, of which the individual himself is unconscious, but which nevertheless find fulfilment or satisfaction in the particular symptoms manifested. These 'wishes' have in nearly every case a sexual goal. When, in our analysis, we trace the history of their development, we find their origin in the sex life of the child, and in what has happened to them then an explanation of how the nervous disorder has arisen. In early life these 'wishes' have come into painful conflict with parental attitudes, with conditions imposed by social circumstances, with other 'wishes,' and the like. As a result they have been, as the Freudians say, 'repressed,'

but have still remained active underneath the surface of the individual's conscious life—in the unconscious—determining thought and behaviour in all kinds of indirect ways, and now expressing themselves in the symptoms of the disorder with which we are dealing. A cure of the nervous disorder is sought by first of all bringing the patient to a clear understanding of the origin and nature of the disorder, and then by a process of re-education directing the 'wishes' involved so that they may find satisfaction in normal and legitimate ways. It ought to be noted that the process of 'repression' takes in Freudian psychology the place of the 'dissociation' of the French schools.

Jung regards nervous disorders from a somewhat different point of view. For him they represent a failure to meet adequately some present situation. While agreeing with Freud that there may be predisposing causes of a nervous disorder, traceable in early experiences of the child, and while employing methods of analysis similar to those of Freud, Jung emphasizes the importance of the exciting cause of the disorder in a present problem or difficulty with which the individual is faced. As a result of failure to solve the problem the individual *regresses* to earlier and more primitive methods of dealing with similar situations. He may meet the difficulty in the way in which he met childish difficulties. There is thus a revivifying of childish attitudes and childish responses, which will explain the symptoms now showing themselves, but the real cause of the disorder is in the present, not in the past.

Adler differs both from Freud and from Jung. As we have already seen, he regards the feeling of inferiority, or the 'inferiority complex' as the fundamental fact in

nervous disorder. He agrees with Freud that the early life of the child is of supreme importance, but the reason for this he finds in the fact that the child in its earliest years forms a 'pattern' or 'schema' of life for itself, which remains as a determining influence in all his subsequent behaviour. A human being in life has three great adjustments to make—to his social environment, to his vocation, and to his sex life. The first adjustment is to his social environment, and that begins in the family life of the child, the 'pattern' then formed largely determining the other adjustments. Hence the importance of the family situation. The nervous disorder of later life is simply a case of maladjustment, a wrong way of realizing the 'pattern' of life of the individual in the situation in which he is placed. It is to be treated by bringing the individual to see how his 'inferiority complex,' and the methods he has adopted to compensate for it, underlie his troubles, and then by a process of re-education to lead him into modes of thought and action which are consistent with his 'pattern' of life, and at the same time in adjustment with the conditions of actual life, social, economic, and marital.

In spite of the acute differences of opinion, which have manifested themselves within this psychoanalytic movement, there are profoundly important matters upon which all are agreed. All maintain that deep in the nature of every human being there are forces, of which he himself is unconscious, but which affect his conscious life and behaviour, his successes and failures, his hopes, his fears, his aims and aspirations, even his physical health, in all kinds of ways. All are agreed that the understanding of the actual forces operating in any given case is a necessary first step in the treatment of the case. The differences

are largely in the working hypotheses which the different leaders employ. There can be little doubt that a coherent, self-consistent, and scientifically established psychology will ultimately emerge. In the meantime many psychiatrists and medical psychologists adopt an eclectic system of doctrine, explaining and treating their cases, now according to Freud's teaching, now according to Jung's, and now again according to Adler's.

The Adlerian teaching has the advantage of being more easily understood than the others, and of being also more immediately and obviously applicable to all kinds of minor nervous disorders. In the sick-room especially, Adler's teaching seems peculiarly fitted to give physician or nurse an understanding of the attitudes and moods of the invalid. In such a case the 'inferiority complex' is clearly to be expected to manifest itself, and an understanding of the forms it takes is evidently important in the interest both of the patient and of the nurse or doctor.

CHAPTER XI

PSYCHOLOGY AND SOCIAL PROBLEMS

THE development of applied psychology with reference to the various aspects of social service and social health has been one of the most notable characteristics of the present century. In this development no work has been more valuable than the work on mental defect and delinquency, with which the whole movement really started, and which constitutes still the most important aspect of the movement. We have already seen that in 1905 Binet published his first scale of mental tests. The primary purpose of this scale was to discover children in the ordinary schools who were so greatly retarded in their mental development, that, in their own interest and in that of society at large, special provision should be made for their education along suitable lines and in schools specially devoted to that end. In 1909 Healy began in Chicago his work among delinquents, with which another world-wide development of vast social significance was initiated. It must not be supposed that the problems of the defective and the delinquent were ignored prior to the beginning of the twentieth century. Much thought had already been given to these problems, but prior to the work of Binet on mental tests and that of Healy on delinquency, practical constructive measures for dealing with the problems were in every civilized country conspicuous by their almost total absence.

FEEBLEMINDEDNESS AND MENTAL DEFICIENCY

We may begin by considering the problems presented to society by the mental defective, and the services rendered by applied psychology in this regard. The first problem of mental deficiency, as far as society is concerned, is obviously the problem of the diagnosis of mental retardation in its various degrees. Prior to the work of Binet only the crudest grading of the different levels of mentality was possible, and only the vaguest notions were prevalent regarding the nature of a phenomenon, met with in almost every community, the phenomenon of the individual whose intelligence was evidently far below that of the average member of the community. No clear distinction was drawn between mental deficiency and insanity, and both were regarded popularly with a peculiar superstitious awe, and even horror, which presented—and still presents—a serious obstacle to the proper treatment of both phenomena.

There are degrees of mental deficiency so marked that even the most superficial observation can at once distinguish them. More or less superficial observation possibly can also distinguish roughly three levels of defective mentality. At the lowest level there is the practically helpless *idiot;* at a slightly higher level there is the *imbecile,* not so helpless, but clearly possessed of a mentality far below the normal; at a still higher level there is the *feebleminded* individual—in America usually called the *moron*—much more intelligent than the imbecile, but still unable to mix with the normal on an equal footing. Such a general classification had indeed been reached before the era of mental testing began, each category of mental deficiency being defined, if it is legitimate thus to speak,

in a very vague way, on the basis of the general impression given by the behaviour of the defective, or the general picture he presented.

With the coming of mental tests it became possible to classify the levels of mentality in a more detailed way, and with much greater precision, in terms of the 'mental age' reached in a scale of mental tests, or alternatively by the 'intelligence quotient.' Thus the *idiot* may be defined as showing a mental level which never exceeds, even when he is adult, that of a normal or average child of two or three, the *imbecile* as showing a mental development which never rises above that of an average child of five or six, and the *feebleminded* as never reaching a higher level that that of an average child of eight to ten. For children the 'intelligence quotient' is really a more satisfactory basis of classification. If the 'intelligence quotient' of the average child is 100 (i.e. 100 per cent. of normal), that of the *idiot* never exceeds 20 or 25, that of the *imbecile* never exceeds 45 or 50, and that of the *feebleminded* never exceeds 70 or 75.

These two classifications may not quite correspond as far as cases on the border-line between two groups are concerned. On the whole the 'mental age' classification is the preferable one for adults, the 'intelligence quotient' classification for children. At the same time it must be confessed that the 'intelligence quotient' really gives an impression of exactness which is hardly justified from a practical point of view. As a matter of fact the legal definition of the various grades of mental deficiency in this country is not yet based on either the 'mental age' or the 'intelligence quotient.' The Mental Deficiency Act of 1913 defined the three grades in the following way:

(*a*) Idiots are "persons so deeply defective in mind

from birth or from an early age as to be unable to guard themselves against common physical dangers."

(*b*) Imbeciles are persons in whom " there exists from birth or from an early age mental defectiveness, not amounting to idiocy, yet so pronounced that they are incapable of managing themselves or their affairs, or, in the case of children, of being taught to do so."

(*c*) The feebleminded are persons " in whose case there exists from birth or from an early age mental defectiveness not amounting to imbecility, yet so pronounced that they require care, supervision, and control for their protection or for the protection of others, or, in the case of children, that they, by reason of such defectiveness, appear to be permanently incapable of receiving proper benefit from the instruction in ordinary schools."[1]

An additional category of ' moral imbeciles ' was also defined, but the existence of this group has been challenged, and on the whole the evidence appears to be against its existence as a separate group, that is, independently of mental defect.

These definitions, which might be said to be based on social efficiency in a wide sense were found to involve, as one might expect, serious practical difficulties in applying the criteria. To remove some of the practical difficulties an Act amending the Mental Deficiency Act of 1913 was passed for England in 1927. In this Act ' mental defectiveness ' is defined as a " a condition of arrested or incomplete development of mind existing before the age of eighteen years, whether arising from inherent causes or induced by disease or injury."[2] As a result of this

[1] See *Report of the Mental Deficiency Committee*, Sect. 27. H.M. Stationery Office, 1929.

[2] Report already cited. Sect. 28.

definition the words "from birth or from an early age" are omitted in defining 'idiot,' 'imbecile,' and 'feeble-minded,' these being otherwise defined as before.

The more serious practical difficulties, however, remained, and these were accentuated rather than diminished, in the case of the group of 'feebleminded' children, by the fact that the Education Act of 1921 defined mentally defective children (the feebleminded group alone is in question) as children who, "not being imbecile, and not being merely dull or backward, are . . . by reason of mental defect . . . incapable of receiving proper benefit from the instruction in the ordinary Public Elementary Schools, but are not incapable by reason of that defect of receiving benefit from instruction in such Special Classes or Schools as . . . may be provided for defective children."[1] Here the criterion of feeblemindedness is quite definitely taken to be degree of 'educable capacity.' This at once raises the problem of the mode in which 'educable capacity' is going to be determined. The test which the Act seems to contemplate is the educational level reached by the child. At any rate no other test is suggested. The criterion in practice, therefore, becomes a purely scholastic one. This is a definite criterion, the only definite criterion so far suggested, but it is a criterion which is quite inconsistent with the intention of the Mental Deficiency Act. It is a criterion also which is quite unsatisfactory, since educational backwardness may be due to quite other causes than mental deficiency.

Recognition of the difficulties in administering the Mental Deficiency and Education Acts led in 1924 to the appointment of a Joint Committee of the Board of Education and Board of Control to consider and report on

[1] Report already cited. Sect. 30.

the various problems of mental deficiency among children, and in particular the difficulties experienced in the administration of the various Acts. The Report of this Committee, issued in 1929, recommended for the first time the employment of psychological tests for the purpose of giving a first general basis for the classification of all grades of mental deficiency. The Report also suggested the substitution of the term 'retarded' for the term 'feeble-minded,' at least as far as educational administration is concerned. The acceptance of the recommendations of this Committee would lead to the following classification:

(*a*) Idiots are children with an intelligence quotient below 20.

(*b*) Imbeciles are children with an intelligence quotient above 20 but below 50.

(*c*) Retarded children are children with an intelligence quotient above 50, but below 80.

These suggestions may be illustrated by taking the case of children whose chronological age is 10. If a child of 10, when tested with mental tests, shows a mental development less than that of a normal child of 2, he is to be classed as an idiot; if he shows a mental development less than that of a normal child of 5, he is to be classed as an imbecile; if he shows a mental development less than that of a normal child of 8, he is to be classed as retarded. At the same time it is maintained in the Report that the social efficiency criterion is the important one. The intelligence quotient therefore cannot be taken as the sole basis of classification, but account must also be taken of "defects of character, temperament, or general adaptiveness." We are, unfortunately, still unable to test and measure these with any degree of accuracy.

The recognition of intelligence tests as providing the

only reliable practical criterion for the determination of the various grades of mental retardation or deficiency is a highly significant step forward. It ensures at least that educational retardation, which is the result of accidental circumstances, illness, or bad teaching, will not be permitted to place a relatively bright child for purposes of education along with children greatly his inferiors in mental capacity, to his great detriment. Moreover, it secures that a child's mental grading will not be determined by some purely arbitrary criterion, invented *ad hoc*, by someone who is not competent to grade a child's mentality at all, and still less competent in proportion as he thinks he is. Apart from the definiteness of the criterion supplied, another great advantage of intelligence tests is the fact that they give a much finer grading of mental level than we can get in any other way. Hence they make possible the classification of children within each category in accordance with their educational possibilities and their needs. At the same time the recognition of intelligence tests makes it imperative that the tests themselves should be reliable. No single series of tests hitherto devised is sufficiently reliable to warrant us in basing upon it alone our decision in doubtful or border-line cases. Tests of different types must in all such cases be employed to supplement one another. In particular ' performance ' tests must supplement ' verbal ' tests, like those of the Binet series, where there is any doubt, and there are even strong grounds for maintaining that performance tests must supplement verbal tests in all cases, if we wish to get a reliable grading of a child's mentality.

As already pointed out, mental deficiency was formerly regarded as akin to insanity, that is, as a mental disease or disorder, and in the popular mind there is still this con-

fusion. It is a relic of this older view that the medical practitioner tends always and everywhere to be looked upon as the one expert who is competent to diagnose mental deficiency in school children. He may or may not be; his medical training is rarely such as to make him an efficient mental tester. In any case, it cannot be too often or too strongly emphasized that mental deficiency, while it may be due to disease or to birth injury, is not necessarily in itself a pathological condition. Just as there are variations in physical stature between wide limits, and extreme deviations from the average in either direction are not necessarily pathological, so in mental stature we may have extreme deviations in either direction from the average, which are not pathological. In fact, the distribution of intelligence, as of physical stature, in the community is more or less in accordance with the normal frequency curve. This fact has a social bearing in several directions. For one thing, it has a bearing on the problem of eliminating the socially unfit by some method of sterilization. If any large proportion of mental deficiency is to be regarded as merely normal deviations from the average, and a fair proportion also as due to birth injury, it is difficult to see how, in the long run, sterilization can be the short and easy method of eliminating the socially unfit that some people have supposed. It is true that such evidence as there is would go to support the view that heredity plays a relatively large part in determining the level of intelligence. At present, however, we know far too little about the laws of hereditary transmission of intelligence to venture on any such drastic action as has been proposed.

The distribution of intelligence in the community, of which the frequency of occurrence of mental deficiency

is only one aspect, has an important social bearing in another direction. Upon this must depend the extent of provision that must be made in a community for the education of the children of different intelligence levels. If a special type of education must be given to children below a certain grade of mentality, and provision must be made in institutions for individuals who are still lower, it is clearly important from an administrative point of view that we should know the approximate numbers for whom such arrangements must be made in any community. At the present time this is perhaps the most pressing problem of the kind, but it is evident that analogous problems are present with respect to individuals at the other extreme of the scale of intelligence. For the solution of these problems, no entirely satisfactory data are yet available. The Report of the Mental Deficiency Committee, already referred to, gives a table [1] based on an extensive investigation, carried out in selected areas in England by Dr. E. O. Lewis. According to this table, of children under 16, 1·1 per cent. in urban and 1·9 per cent. in rural areas are to be regarded as mentally defective. Of the population as a whole, children and adults, ·7 per cent. in urban and 1 per cent. in rural areas are mentally defective. Of the 1·1 per cent. defective children in urban areas, ·25 per cent. are either imbeciles or idiots, and of the 1·9 per cent. in rural areas, ·35 per cent. are either imbeciles or idiots. These figures agree fairly well with the percentage to be expected on theoretical grounds, as calculated from the 'scatter' [2] obtained by Terman in the standardization of the Stanford Revision in America.

[1] *Report*, Table 9.

[2] By 'scatter' is meant the amount of variation in the group from individual to individual, and therefore the range over which the

The most recent work in this field, however, would suggest that both Lewis's and Terman's estimates are too low. In a great survey, undertaken by the Scottish Council for Research in Education in 1932, in which every child born in Scotland in the year 1921 was tested, the 'scatter' was found to be considerably greater than that found by Terman. If this 'scatter' is taken as the basis of calculation for the distribution, then, making every allowance, the percentage of mental defectives, exclusive of institution cases—or idiots certainly and possibly imbeciles—may be as high as 3 per cent. and is certainly above 1·5 per cent. The distribution of levels of intelligence, calculated from Terman's results, and from those of the Scottish Survey, is given in the following table:

TABLE 6

Intelligence Quotient.	Percentage (Terman).	Percentage (Scottish).
Above 130	1	3
110–130	21	24
90–110	56	46
70– 90	21	24
Below 70	1	3

JUVENILE DELINQUENCY

From the consideration of mental deficiency we are led naturally to the consideration of juvenile delinquency, another field in which psychology is being widely and fruitfully employed at the present time. The problems of the delinquent and the criminal are among the most serious problems with which organized society is faced. These words 'delinquent' and 'criminal' in

measurements extend. It is usually measured by the 'standard deviation.' This was with Terman 13, and in the Survey 16 or 17.

popular speech are almost interchangeable, except that 'delinquent' usually implies a less serious breach of the law. It seems desirable, however, in the present discussion to restrict the term 'delinquent' to the juvenile offender against the law, and whenever the word is used in what follows, whether or not the word 'juvenile' is attached, it will always mean a young offender. The distinction, therefore, between 'delinquent' and 'criminal' is not to be taken as a distinction of degree as regards the offence, but of age in the offender. There is no general agreement as to the age at which delinquency may be regarded as passing into crime, but it seems reasonable to take this as coinciding with the age at which the individual becomes legally an adult citizen. The importance of this distinction lies in the fact that the attitude of society towards the delinquent or young offender has in recent times become essentially different from its attitude towards the criminal. The tendency is more and more towards regarding the young offender as a protégé, rather than as the enemy, of society, and recent legal and psychological developments in this connexion have been largely from this point of view. It is gradually coming to be realized that, in dealing with a delinquent's offence against the law, society should act as the guardian and protector of the young offender, and the guardian of its own interests in the future citizen, rather than as a prosecutor in the law court, with a view to bringing the offender's guilt home to him, so that punishment may follow. We shall consider the problems of social punishment later; in the meantime we must deal with the developments in which this view-point has expressed itself.

The most important of these developments is the psycho-

logical clinic for children, now generally known as the 'Child Guidance Clinic.' The pioneer in this development has been Dr. William Healy, who in 1909 organized in Chicago, in connexion with the courts, a clinic for the purpose of studying young offenders, with a view to tracing the causative factors issuing in their anti-social behaviour. Healy's work has led to a new understanding of delinquency and to the organization of constructive measures for dealing with it. The Child Guidance Clinic proper came into existence twelve years later with the object of preventing delinquency, rather than reforming the child or youth after he had become delinquent. It might be defined as a social agency whose object is to study and treat any child showing in its behaviour characteristics that might possibly, and even probably, lead in later life to social inadequacy, criminality, or mental disorder, or generally any undesirable characteristics whatsoever. Thus, not only was its work preventative rather than curative, but its objective was also rather wider than Healy's original objective. There cannot be any doubt that, if the real needs of the community are to be met, psychological clinics for children must aim at the study and treatment of cases where the question of delinquency does not arise at all, at least as an immediate issue. Judging from experience in this country, we must interpret 'child guidance' much more widely indeed than the original intention even of the Child Guidance movement would lead us to suppose.

A fundamental feature of the organization of the Child Guidance Clinic is team work, and the emphasis upon this is probably one of the most valuable of the contributions which the movement has made to social service. It is recognized that for successful work, at least in all

major problems, it is essential that the child should receive a thorough medical examination, as well as a thorough psychological examination. It is also essential that the environmental background of the problem presented, the background in the home, the school, and the community, should be investigated, and the child's individual history, as well as his family history, explored. Hence it is clear that four distinct fields of study are involved—the medical, the psychological, the social, and the educational. The team, therefore, must apparently comprise experts in each of these four fields—an expert in children's diseases, a psychologist, a director of social inquiries and social service, and a specially trained teacher.

Psychological study of maladjusted children in Child Guidance and other clinics, or by individual psychologists, such as Cyril Burt, working independently, or largely so, of such organizations, has thrown valuable light on many problems of vital social significance. Of these problems the most important and comprehensive is that of the causation of maladjustment in children, and particularly of such maladjustments as tend most readily to issue in delinquency. The causative factors in producing delinquency have been admirably treated by Healy [1] and by Burt,[2] to whom the reader desirous of a more detailed discussion is referred. Here only a summary of the main facts can be attempted.

It is very rarely that we can assign a single factor as the cause of delinquent behaviour. Nearly always such behaviour is the result of a number of co-operating factors. These factors fall into two groups. On the one hand there is some kind of predisposition, mainly congenital,

[1] *The Individual Delinquent.*

[2] *The Young Delinquent.*

in the individual himself; on the other hand there are environmental conditions, under the influence of which the predisposition manifests itself in anti-social behaviour. That is to say, environmental factors operate in every case; there are no born delinquents or criminals. Hence the very great importance of our knowing the environmental factors which tend to produce them, and of understanding how these factors operate. Any preventive measures adopted must obviously depend on such knowledge and understanding.

Considering the environmental factors first, we find that they in turn fall into two main categories: (*a*) factors within the home and family, or, in short, home conditions, (*b*) factors outside the home, in the school or in the street. Poverty in the home, defective home discipline, defective family relationships, moral laxity or depravity in the home—any or all of these may be found to play a significant part in producing the maladjusted child who becomes delinquent.

Poverty may exert its influence in various ways. In the case of extreme poverty there is a condition of semi-starvation which readily prompts to theft of food, or of means to procure it. Where the family has at one time been in better circumstances, the contrast between the present and the past may lead to similar results in the behaviour of the child seeking to obtain what formerly was not denied him. The overcrowding which is an accompaniment of extreme poverty is a condition favouring the occurrence of sex offences, and the absence of all facilities for play or recreation may obviously favour the anti-social employment of the energies normally finding occupation in that way.

Defective family relationships, defective home disci-

pline, moral laxity or vice in the home, more especially the first, are found even more frequently to be major causes of maladjustment and delinquency among children. Such conditions tend to distort the child's outlook on life, and are fruitful sources of emotional conflict, which so often finds expression in misconduct. Where the relations between the parents are unsatisfactory, where a home has been broken up as a result of divorce, where one of the parents has died, and there is a step-father or step-mother, the development of the children along normal lines is probably the exception, rather than the rule. If the discipline at home is too strict, or too lax, or arbitrary, we again have conditions under which normal development of the children is hardly to be expected. Moreover, foolish parents with the best of intentions, a mother's love even, if unwisely expressed, may bring about conditions in the home which may readily produce maladjusted children. It is frequently said that we should speak of 'parent guidance' rather than of 'child guidance,' and it is certain that some of the most valuable work of the Child Guidance clinics takes this direction.

The factors outside the home are not, as a rule, so dominant influences in the causation of delinquency, at least not without co-operating factors within the home. The most important of the influences outside the home is probably the company kept and friendships formed. The manner in which the child's leisure is spent may also frequently bring temptation in his way to his own undoing. If there are excessive facilities for amusement in the neighbourhood, we may find, especially if the school situation is for any reason unsatisfactory, a development of truancy leading to outlawry and theft. If, on the other

hand, facilities for lawful amusement are wanting, if for example there are no playing fields or recreation grounds, unlawful amusements will be found, and may be a first step towards serious delinquencies.

The kind of behaviour that the child manifests depends, of course, not merely on external circumstances in the home or beyond it, but also on factors in his own nature from the start. As has already been pointed out there is no evidence that any such variety of the human species as the born criminal exists. At the same time it is unquestionably true that some individuals inherit characteristics, which under the influence of certain environmental conditions readily develop anti-social or vicious tendencies. Some natural human impulse may be excessively strong, such as acquisitiveness, self-display, aggressiveness, or sex. There may be from the beginning temperamental or emotional instability. The physical health may be such as to produce, or at least accentuate, such characteristics. The most important of all congenital characteristics, however, is defective intelligence, varying from mere dullness to definite feeblemindedness.

The estimate of the prevalence of subnormal intelligence among delinquents and criminals varies enormously from investigator to investigator. The variations are partly explained by differences in the group and type of cases investigated, and partly in the standards of intelligence adopted. Healy among his first thousand cases at Chicago classed 18 per cent. as subnormal, among whom he regarded 10 per cent. as definitely feebleminded. Williams[1] as a result of his study of boys in Whittier School, California, concluded that 32 per cent. were subnormal. Even higher percentages were found by

[1] *Journal of Criminal Law*, Jan. 1916.

some investigators. On the other hand, in an investigation[1] into the mentality of the boys in the Scottish Borsta Institution at Polmont the present writers found a percentage of feebleminded as low as 7 per cent. All investigators, however, are agreed that the incidence of feeblemindedness is very much higher among delinquents than in the general population, and that low intelligence is an important factor in the causation of delinquency. Most are agreed also that the intelligence level between 60 and 85 'intelligence quotient' furnishes a quite excessive proportion of young delinquents, as well as of adult criminals.

To illustrate the way in which various influences may play upon a child and influence the course of his development, the following extremely interesting case may be quoted from Burt[2]: "Johnny E. is about 7½, but he only looks 5½. He is a diminutive child with a chubby and cherubic face; and the first ejaculation of almost every woman that sees him is: 'What an angel!' Johnny, however, is anything but a little seraph; he approaches far more closely to the unspeakable reverse. At one time he was idolized by all his relatives at home. They praised him; they petted him; they pampered him in every way. But soon, so great were the calls he put upon their patience, that everyone in turn grew weary of his company. He was sent to an infants' school, and the same history was repeated. For a day or two he was the special favourite of the class; and for the rest of the time, its terror. By those who had to live with him day after day, his selfish temper was rapidly realized; and he soon found that his most profitable line of work was to touch

[1] Annual Report of the Prisons Department for Scotland, for the year 1930. H.M. Stationery Office, 1931, pp. 44–51.

the hearts of strangers. He lived near a fashionable quarter, much favoured by elderly ladies with large sympathies, full purses, and no children of their own. Their philanthropy was his undoing. He had, to begin with, a dexterous knack of giving every escort the slip whenever he was fetched from school. Some older person had always to be deputed to convoy him safely home; but, however tightly his little fist was gripped, he could always produce a convulsive sneeze or a sudden need for a handkerchief; and once his hand was loosened, Johnny was round the corner faster than grown-up legs could follow him. Having scurried away, and vanished from sight, he would carefully roll in the mud, untie his bootlaces, or perhaps pull off and hide his shoes and stockings altogether, and then sit upon a curbstone piteously whining. It was seldom that many minutes passed before some gracious lady would come up to him, lift him in her arms, wipe away his tears, and ask the cause of his heart-rending sorrow. According as he judged the probable response, Johnny would then relate how father was penniless, or mother cruel, or how he himself had lost his way, or had neither home nor parents to go to. Between many gulps and sobs, pathetic touches would be added, lurid and fantastic enough to raise suspicion as to the veracity of the whole romance; but after all an atom who looked only five or six years old could not be expected to be precise in detail, and lips so babyish were obviously incapable of lies. By these and similar tactics Johnny could procure an afternoon of bounteous entertainment, such as he never enjoyed at home. Sometimes the kind Samaritan would lodge the young waif in her house for a day or two; and feast and make a fuss of him until an inquiring officer tracked him down; at the very least he

was sure to get toys or sweets, or a handful of coppers to spend."

THE CRIMINAL AND SOCIAL PUNISHMENT

When we pass from the delinquent to the criminal, we find that, though the attitude of society to the criminal is necessarily different from its attitude towards the delinquent, nevertheless modern psychology has exercised an influence here also, which has radically modified the point of view from which the criminal is regarded, and may even be said to have made much of the older criminology obsolete. This alteration in point of view will be best exemplified by a consideration of the changes that have taken place in comparatively recent times in the theory and practice of social punishment. That these changes are due, either directly or indirectly, to the application of psychology, however unconscious and unsystematic, to problems of social punishment, there cannot be any doubt. Society now recognizes that no matter how deeply an individual has sinned, his sins do not free society from its responsibility for its treatment of him, or for the consequences of that treatment on him and on other people. It is recognized further that this responsibility imposes on society as an imperative duty the careful examination of what it is doing, and why, in punishing him, and this in turn involves the necessity for an examination of the penal system, and the results produced by the penal system, from a psychological point of view.

The root idea in punishment, as ordinarily understood, is the infliction of some kind of disagreeableness, pain, or loss on an individual, because he has been guilty of some misdeed. There are thus two aspects—on the one hand the infliction of hurt, on the other hand the relation of this to some wrongdoing or crime. Originally any end to be

gained by such infliction was scarcely conscious, if it existed at all—any end, that is to say, beyond the satisfaction of the anger evoked by the misdeed itself. From the primitive source of punishment in the anger caused by the wrong to the modern conceptions underlying social punishment, there has been an evolution of psychological theory, conscious or unconscious, in which four stages or phases can be recognized. These phases may be designated the vindictive, the retributive, the protective or deterrent, and the reformatory or curative.

To begin with, an individual who has suffered injury by the wrongdoing of another responds to the injury with the emotion and impulse of anger. This anger is satisfied by the infliction of some hurt on the wrongdoer. At the simplest and crudest stage of development—the stage at which we have to deal with the mere instinctive impulse of the brute or the savage—the hurt inflicted on the wrongdoer may have no direct relation, either in kind or in degree, to the injury done, but only to the intensity of the anger evoked. This is not really punishment in any strict sense, but this is nevertheless the psychological origin of punishment, and may be said therefore to mark the first stage in the evolution of what became punishment in the strict sense. This is the vindictive stage or phase. In so far as punishment at any time reveals as its psychological background the impulse and emotion of anger, it tends to represent this primitive vindictive stage.

Even in a very primitive social life some crude notion of justice must very early act as a determining influence with respect to the hurt that may be inflicted on another for some injury done. It is only necessary to put ourselves in the place of the impartial onlooker to understand the psychology of this. So far as some notion of

justice is a conscious determinant of the hurt inflicted on the wrongdoer by the injured individual, this hurt takes on the character of retribution, and punishment as such may be said to come into being. This phase or stage in the evolution is the retributive phase or stage.

Another factor must have made its influence felt in a rudimentary way at a comparatively early period. The notion of punishment must have involved a looking forward, as well as a looking backward, in the shape at least of a dim feeling that similar actions to that which has incurred the punishment must be prevented in the future. That is to say, there can be little doubt that, at a comparatively early stage in primitive social life, it must have been felt, at least vaguely, that punishment had a protective function, since by means of punishment of a culprit, an individual and society were protecting themselves, or were being protected, against the repetition of an injurious act.

The general line of evolution of our modern penal systems is thus clear. First of all, we have purely vindictive action on the part of the injured individual. Then there is some sort of legalizing—if we may use that word—of retributive action on the part of the injured, so long as this retributive action does not go beyond the limits of 'justice,' this being more or less regulated by social law and custom. Finally, recognizing that punishment has a protective function, as far as social life is concerned, society itself takes over the infliction of punishment, and a penal system is inaugurated. This marks the protective or deterrent phase or stage.

To leave the matter thus, however, would be to obscure important aspects and phases of the actual course of events, and could not fail to produce a misleading impres-

sion of the facts. Stages in social evolution are never clear-cut. Thus the development of the retributive view of punishment by no means involved the discontinuance in practice of vindictive punishment. Still less did the realization of protection as the primary social function of punishment alter the practice founded on the older and more primitive conceptions. Practice lagged, and still lags, a long way behind theory in this, as in so many other cases. The psychology of what happened would seem to be that the crude emotion of anger remained the driving force behind punishment, though it was cloaked and obscured by other motives, and by various forms of rationalization. One leading authority on criminal law has placed on record his conviction that it is "highly desirable that criminals should be hated, that the punishment inflicted upon them should be so contrived as to give expression to that hatred, and to justify it so far as the public provision of means for expressing and gratifying a healthy natural sentiment can justify and encourage it." [1]

Thus it is certain that the realization by society in theory that the function of punishment from the point of view of society is primarily protective did not prevent, and still does not prevent, an almost religious sanction continuing to be attached to the *lex talionis*—'an eye for an eye' It is equally certain that the protective function of punishment was frequently made the excuse, as in the authority just quoted, for continuing the practice of vindictive punishment—'for deterrent purposes' was the usual rationalization—even when it was quite evident that the psychological situation thus produced was quite

[1] Sir J. F. Stephen: *History of the Criminal Law of England*, Vol. II, p. 82.

inimical to the ends sought. Curiously enough also, the humaner—and indeed more intelligent—attitude and practice of the present day was due far less to recognition of the fact that vindictive punishment for deterrent purposes was frequently a failure, than to the fact that the infliction of pain and suffering on human beings has become objectionable to the general sense of society.

The stage of evolution now arrived at is characterized, on the one hand, by the discontinuance, or the radical limitation, of what was virtually the primitive vindictive punishment in disguise, and, on the other hand, by the recognition of a possible reformatory or curative employment of social punishment. It is at this point that modern psychology is exercising its influence. The actual situation, however, is somewhat complex. Practically punishment still rests, in law and in popular thought, on the retributive basis—the *lex talionis*. Theoretically, it is recognized that, from the point of view of society, punishment has as its primary function the protection of society, and that society is not directly concerned with the retributive aspect of punishment as such, but only indirectly because of the deterrent effect of retributive punishment. Moreover, it is also coming to be realized that, so far as the individual is concerned, social punishment may be employed so as to conduce to the reform of the wrongdoer, and that this reformatory function of punishment is well worth keeping in view, not only on human grounds, but also because reformation of the individual means the protection of society against the repetition of the injury, so far as that individual is concerned. At the same time it is conceded that the attempt to reform the criminal must not involve the sacrifice of the primary aim of social punishment.

The psychological problems of social punishment thus appear to fall into two groups: on the one hand, those involved in a consideration of the effects of the punishment on the individual who is punished, and, on the other hand, those connected with the effects of punishment on the community itself. Of course there is a repercussion on society of the effects on the individual, so that ultimately the problems are in all cases social problems. Nevertheless, it is possible to discuss the individual effects and the social effects separately.

Take first the effects of punishment on the individual who is punished. So long as the retributive aspect of punishment is placed in the foreground the only psychological problems of serious import are those involved in the question of the responsibility of the offender. Over the question of responsibility medical and legal minds have long been at loggerheads. This age-old controversy is due to the fact that 'responsibility' is used in different senses. For the lawyer 'responsibility' is a purely legal term, and the question of responsibility is to be determined on the basis of evidence germane to its legal meaning. For the medical man 'responsibility' carries with it ethical implications. As the controversy develops the lawyer insists on discussing psychopathology and medicine, which he is not competent to discuss, and the medical man insists on discussing ethics, which, however competent he may be to discuss it, has little relevancy to the problem whether the individual is to be regarded as legally 'responsible.'

From the legal point of view the question of 'responsibility' involves the employment of a psychological criterion—the ability of an individual to understand the significance of, and exercise control over, his actions—

which the psychologist recognizes as extraordinarily difficult, if not impossible, to apply. In the opinion of the psychologist the question of 'responsibility' is a question inherited from an antiquated and outworn theory of punishment, and if it rises at all in connexion with social punishment, it is not at the point at which it is usually raised, nor in the form in which it is generally put.

The vital psychological problems only emerge when we stress the deterrent and reformatory aspects of punishment. So far as social practice is based on these two effects, it is not too much to say that it must be guided primarily by psychological considerations. The two objectives of punishment are not inconsistent with each other. We may aim at the protection of society, which is the aim of deterrent punishment, by the reform of the criminal. That, however, will not necessarily protect society against the same form of crime in another individual, which is the reason why we must consider punishment, rather than reformation pure and simple. It is obvious that the failure of reformatory measures must not mean the failure of society to protect itself; other measures must be available, which are merely protective, and not at all, or only indirectly, reformatory.

Consider for a moment the psychological effects of punishment. The function normally performed by unpleasantness encountered in the activity of any living organism is to guide the activity so that unpleasantness may in future be avoided. It is only low down the scale, however, that the phenomena are to be seen in their simplicity. As we pass up the scale the inner conditions which determine behaviour become more and more complex, and the actual results of any unpleasantness, or fear of unpleasantness, become more and more

difficult to foretell. With the human being the complexity of the inner situation has become enormous. The web of impulse and motive is so intricately and so subtly woven that the introduction of a new impulse and motive by means of punishment may come to have a result wholly unforeseen, and entirely different from the result intended.

However simple the general psychological theory of punishment may be, the practical difficulties in administering social punishments, with a view to reforming the criminal, are very formidable. One source of practical difficulty is the actual, and possibly innate, differences between individuals, which make them respond in entirely different ways to the same external situation. What is intensely disagreeable to one individual may not seriously inconvenience another, and may be positively pleasant to a third. Hence a punishment that is effective with one individual may be quite ineffective with another. There are even differences in the same individual at different times, so that a punishment effective at one time may be quite ineffective at another, with the same individual. A second source of practical difficulty is the fact that the effect produced by punishment has a very different duration for different individuals. One extreme is illustrated by many mentally defective offenders.

The most important source of practical difficulty, however, is our almost complete ignorance in many cases of the inner conditions which issue in any particular offence against the law, which necessarily involves ignorance of the effect which our punishment is likely to produce. As far as the reformatory aspect of punishment is concerned this is a very serious matter. We are here trying to modify the behaviour of an individual, and in order to do so we

must know the facts of that individual case. This is the argument for clinical study of the adult criminal as of the juvenile delinquent. Any psychologist who has had experience of conflict cases can appreciate the difficulties of the situation. The usual form of misdemeanour occurring in such cases is theft, and frequently irrational and apparently motiveless theft. Thus, money, jewellery, and all kinds of things may be stolen and given away, or even thrown away. Until the inner conditions are understood, no kind of treatment, whether in the form of punishment or in another form, seems to be of any avail. Or sometimes, where punishment is apparently successful in eliminating the tendency to one particular kind of wrongdoing, there is a criminal outbreak in a totally different direction, the result of the punishment itself.

There is undoubtedly a class of offender in whose case treatment, rather than punishment, is the appropriate procedure. Other cases occur with fair frequency in which punishment as ordinarily understood is quite ineffective because of serious mental defect. It may be possible to determine beforehand, without waiting for the event, whether punishment will be effective for reform, and if so what kind of punishment, or whether the case is one demanding treatment, and if so what kind of treatment.

The method of self-protection that society utilizes most frequently is restraint of the offender in some appropriate institution—as far as the idea of punishment is involved, some sort of prison. The restraint or imprisonment may be merely temporary, or it may be permanent. In the first case it is clear that the reformatory aspect of punishment should still be kept in view, so far as the psychological situation is taken into account. If it is not, it does not

require much foresight to prophesy somewhat lamentable results. In particular, if the criminal is returned to social life, not only with his tendency to the original form of offence unaffected, but with other anti-social tendencies developed by his prison life, or by circumstances arising out of his prison life, society is certainly playing the fool. When the restraint is permanent, while reformatory measures appropriate to the case must not be entirely excluded as intrinsically hopeless, the whole psychological situation and outlook are different. The prisoner will never be returned to civil life. For the protection of society he must be kept permanently in restraint. But he is a human being, and the moral sense of society will demand that he be treated as such, not merely negatively by the avoidance of inhuman conditions, but positively by the provision of such amelioration of his lot as is possible without sacrificing essential principles. There will be general agreement that the stigma of prison life means in itself a very serious modification of the psychological situation in the case of every individual who incurs it, so serious that no psychologist can regard short-term prison sentences with anything but dismay.

Turn now for a moment to the deterrent function of punishment. This has played no inconsiderable part in the discussion of penal systems at all times. The severity of past penal systems has been largely due—so far as it had a rational basis at all—to the attempt to deter others from similar offences to those for which punishment is inflicted on an offender. It is unquestionably the case that many a misdeed is prevented by the fact that the individual who is tempted knows that he will inevitably pay the penalty. The justification of a deliberate use of punishment for deterrent purposes must rest on other

considerations than the purely psychological. Whatever justification is attempted must satisfy the moral sense of the particular society. That is, however, at present a side issue. The deterrent effect of punishment as a fact is the point that concerns the psychologist, and his business as a psychologist is to analyse and explain this fact.

It cannot be lightly assumed that the deterrent effect of punishment depends merely on fear of the disagreeableness or suffering which the punishment in itself involves. The penal system is an expression, however imperfect, of the sentiments of society with respect to certain acts—sentiments of hatred in varying degrees. It is not the result of a purely intellectual review of the social results and bearing of these acts. Apart, therefore, from the punishment by law decreed and legally inflicted, the criminal act is inhibited, so far as the normal socialized individual is concerned, by this sentiment in himself and in his fellows. "The sentence of the law," to quote again the legal authority already quoted, "is to the moral sentiment of the public in relation to any offence what a seal is to hot wax. It converts into a permanent final judgment what might otherwise be a transient sentiment."[1] Fear of the punishment as such, fear of the social disapprobation dependent on the invoking of the moral sentiment, of which the punishment is a concrete and tangible embodiment, recoil from the act because of the existence in the individual who is tempted of the moral sentiment in question, in however feeble, attenuated, and fragmentary a form—all these are motives holding back an individual member of society from wrongdoing. The legal punishment exerts its deterrent influence because it,

[1] *Loc. cit.*

as it were, embodies and presents all of them in unmistakable fashion. The relative force of the different motives will vary with individuals. But until we can rely on the last of these motives being sufficiently powerful to restrain every individual member of society from the breach of social laws—which would seem to involve a radical change both in the existing social structure and in human nature—the social necessity of some kind of penal system, with the deterring from wrongdoing as one of its objectives, must remain.

PSYCHOLOGY AND THE LAW-COURT

The application of psychology to problems of the law-court is by no means one of the more recent of the practical applications of the science. There is a well-known laboratory experiment, generally spoken of as the *Aussage* experiment, which appears to have an obvious bearing on evidence given in the witness-box. In this experiment, as usually conducted, a moderately complex picture is exposed to the subject for a short time, the subject being at the same time told to observe it carefully, since he will later be asked to describe everything he has seen, and also to submit to a cross-examination on the picture. It has been found as a result of this experiment that a full and accurate report is the rare exception. Accurate reports are generally very meagre, the subject making no errors because he makes few statements. But on the average about 12 or 15 per cent. of the statements made are inaccurate or false. The longer the interval of time between the exposure of the picture and the report of the subject, the greater the inaccuracy. Not only are there many erroneous statements, but the subject is usually willing to swear to the majority of them.

The number of erroneous statements may be greatly increased in the cross-examination, and particularly if the questions are put in such a form as to suggest a definite answer. All questions convey a certain degree of suggestion, even the simple determinative question of the form: "What is hanging on the wall?" which suggests at least that there is *something* hanging on the wall. The implicative question, which is a question implying the presence of some object in the picture, whether or not the object is really there, is obviously a very strong suggestion that it is there. Any question, indeed, which is put in such a way as to presuppose a certain answer, is fairly likely to get that answer. To get false testimony from children by means of suggestive questions is an easy matter, and the younger the children the easier it is. Even the adult, however, and the educated adult, is readily led into false statements by suggestive questions.

A variation of the picture experiment is to have the experimenter carry out in front of the subjects a prearranged series of actions—unknown of course beforehand to the subjects—and then get a report and carry out a cross-examination as before. Practically the same results are obtained as in the picture experiment. If the conditions under which observation takes place are made at all difficult, the number of false statements may be greatly increased. Another allied experiment is the 'rumour' experiment. In this experiment a statement is made to one of a number of subjects, and then passed from individual to individual through the whole group. The final statement is compared by the experimenter with the statement originally made. This kind of experiment is intended to throw light on the manner in which, and extent to which, hearsay evidence is falsified.

Apart from errors due to the influence of suggestive questions, the main sources of error are (*a*) misapprehension of the original experience, (*b*) lapses of memory, and (*c*) the blending of the imagined with the actual. Misapprehension may be due to failure to observe certain points owing to the attention being otherwise engaged, and, as a result of expectation based on previous usual experience, drawing erroneous conclusions, which in turn are illusorily apprehended as if actually perceived. The illusions produced by the conjurer afford admirable illustrations of this kind of falsification of perception. Lapses of memory lead to erroneous statements in a similar way. The subject fills up the gaps in accordance with previous experience, and is unaware that he is adding anything to what was perceived. The blending of the imagined with the actual is particularly characteristic of the reports given by children, but 'fishing' stories prove that it is not unknown among adults.

All this experimental work has shown how unreliable the testimony of the eye-witness may be, and the caution with which such testimony must be received in the law-court. Hearsay evidence is usually excluded, but much of the evidence which is accepted may be as unreliable as hearsay, and some of it may actually be hearsay masquerading as real and direct experience. The weighing of evidence, indeed, demands much more expert knowledge and skill than is given to it at present, especially perhaps in our jury trials. This is another matter in which the more intelligent and more scientific handling of the crime problem is long overdue.

From time to time suggestions are made that some method or other of the psychological laboratory should be employed for the detection of guilt in an accused indivi-

dual. In countries where 'third degree' methods can be employed trial has been made of various laboratory techniques, which appeared to present possibilities of being used in this way. The success of such attempts up to the present has been very slight, and indeed problematical. In fact all 'third degree' methods, even where they are permitted by the moral sense of society, are regarded with grave misgiving by the psychologist. They may be successful where a conviction is sought rather than the truth, but no enlightened society can for long tolerate such an attitude.

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