AN OUTLINE
OF
INDIVIDUAL STUDY

BY

G. E. PARTRIDGE, Ph. D.

FORMERLY LECTURER IN CLARK UNIVERSITY

New York

STURGIS & WALTON

COMPANY

1910

Set up and electrotyped. Published March, 1910

CONTENTS

PART I

HISTORY AND THEORY OF INDIVIDUAL STUDY

PART II

PRACTICAL STUDY OF INDIVIDUALS

CONTENTS

PART III

APPLICATION AND RESULTS OF INDIVIDUAL STUDY

PREFACE

This manual of methods for the study of the human individual is intended to serve a practical and introductory rather than a scientific purpose. It is not intended for students interested in research, but is for those who wish a first guide in the study of individuals. It is in one sense and not another that it is called practical. It does not contain much about standards and results of experiments, by means of which one can safely compare individuals with the average or norm, for the purposes of an exact or scientific pedagogy. It is intended to be practical in the sense that it is hoped that by it the student can be led to observe individuals more intelligently and systematically, and thus be the better able to understand and serve them. Incidentally it is to be hoped that some insight into the nature of individuality and the scientific study of it will be acquired.

The book comprises for the most part a course of study that has been used several times in classes in a Normal School, each time with an increased conviction that some such work is the best psychology and pedagogy for

these classes: for with the attention focused on the individual and his needs, general problems cannot fail to appear also, and practical questions are always within reach. This is the case method that has succeeded so well in the training of physician and lawyer. That it has a wider application in the training of the teacher than has yet been given it, seems to be indicated. As a method of mind training it has some of the advantages of the intensive work of higher grades, and the value to the student of studying thoroughly one or a few individuals is believed to be great. The particular experiments made, and the scientific knowledge gained are of minor importance from this consideration, but the increased power to analyze the life-situation of another person that is acquired is of great value. To be led from a state of ignorant indifference toward an uninteresting person to a sympathetic and intelligent coöperation in his welfare is one of the best experiences that can come to any one, and particularly to a teacher.

In practice, work such as is outlined in this book can be given to students either before or after other study of pedagogy and psychology. The experience and observation of the writer lead him to the conviction that most so-called general psychology, even the most elementary, fails to affect the practical life of the teacher, and that more study of the kind that brings

the student into contact with children is needed in Normal Schools. It seems better to lead to psychology from practical questions that arise in actual teaching or observing of children than to try to apply psychology in advance to the work of teaching. Students do not readily apply psychology, and one successful training teacher whose experience extends over a period of twelve years declares that in all her acquaintance with practice teachers she has never known an instance in which any reference was ever made spontaneously by a student to any principle or fact that had been acquired in previous psychological work. Such testimony, if it is at all representative of the state of affairs in the Normal School, argues for closer contact, on the part of the psychological student, with the problems of the schoolroom and the individuals in it.

If some general psychology is to precede observation and practice it seems best that it should be largely genetic psychology; study in which the teacher-to-be is made to live again his own childhood, and to follow the course of his own mental development. If this is entered into with zest by the student it is difficult to see how study of systematic treatises on analytic psychology, in the time that is usually devoted to psychology, can add much to the practical result that is desired for the teacher.

The experiments and methods of observation

that are described have been gathered from many sources, and no special effort has been made to give credit to those who have first suggested them, except in cases in which the results of research made by the method have been mentioned. The greatest single source of assistance has been the work of Binet. Many of his tests have been used, and some of them modified to suit present purposes. The experimental work of American writers has yielded others: some have been devised by the writer. Nearly everything in the book has been put to considerable trial in actual investigations. Some of the tests have been modified as a result of such use, or to avoid the use of apparatus: some are described exactly as they were tried. The purpose being to stimulate practical observation of individuals, rather than research, it has not been thought necessary in some cases to describe the methods in full detail, but to leave something to the choice and ingenuity of the student. The investigations and observation of the writer upon which the methods are based are as follows: — Investigation of special topics such as control of the reflex wink and description of an imaginary animal made upon Worcester school children; study of two hundred East Side school children, New York, with H. S. Curtis, reported in New York School Board Reports 1898; physical examination of two thousand school children,

Worcester; study of physical condition of school children, Mankato, Minnesota; report to Worcester School Board on examinations of sight and hearing of school children; study of a group of eighty school children during a period of three years, Mankato Normal School; study of defectives in schools and hospitals, Worcester; study of twins, reported in Chapter I, Part III. Some of the material used in Part I is adapted from unpublished lectures delivered at Clark University in 1905, on the subject of Variational Psychology.

G. E. Partridge.

Worcester, Mass.,
December 5, 1909.

HISTORY AND THEORY OF INDIVIDUAL STUDY

I

THE NATURE OF INDIVIDUALITY

20/20

Although to the student of philosophy the nature of individuality is a profound problem, for our ordinary practical purposes we have a sufficiently clear understanding of what we mean by a human individual. We speak of ourselves and others as individuals, thinking of individuals as centers of action, and possessors of a unique mental content, into which no other person can penetrate, except indirectly. Individuals moreover possess bodies through which the inner life is partly expressed and by means of which they contend and coöperate with each other. Many experiences in practical life teach us that there are many differences among individuals; that, indeed, no two can be found that are exactly alike.

Study of other forms of life than the human shows that variability among individuals also exists even in the lowest orders of life, both in the vegetable and animal kingdom; that though individuals of these orders are less complex than the human, yet they differ greatly from each other. Accepting the evolutionary theory of life, it is plain that the problem of

individuality in the human race may be regarded as a part of a larger problem that deals with variability in general as it appears in all forms of life. Individuality therefore is a deep scientific problem.

An individual, regarded as a scientific problem, presents himself for study in several different aspects. He is, first, a member of a species, an individual different from all other individuals of that species. Being complex, he can be analyzed into factors or elements, and can then be compared with others of the species with reference to the characteristics of these elements. The ideal of an exact science of individuality would be to measure each of the variable traits and to assign the individual with regard to it, to his place in the species.

But an individual would not be described completely even if it were possible to attain this ideal, for he is more than a mere collection of variables; he is a unique whole, in which the parts are balanced in just such a way as to make this particular individual. Analysis fails to find the whole nature of a man, just as a description of the features one by one would fail to be a description of that whole we mean when we speak of a face. Two faces very much alike in the analysis would be very different in the total; so two individuals similar in the analysis may be different when ap-

preciated as wholes; when they are judged with reference to their values, social and ethical. Conversely two people much alike in their social and ethical values may be quite different in their composition, a similarity of result being produced by a different combination of elements.

But this descriptive method, even when both analytic and synthetic points of view are taken, does not yet tell us entirely what is meant by an individual; for a person is not only something that can be analyzed and described, but he is, from birth to death, a concrete series of connected events, only a part of which can be understood by examining his nature as a sum of parts, or even as a member of a group; for in a measure these events are the result of forces not contained in the individual at all, and in some cases the whole career seems to hinge upon a single event.

An individual therefore is not only a bundle of elements interrelated with each other; he is a whole which can be described and judged as such; and he is that which he appears to himself to be, a self with a life history made up of concrete events, some of which are the fulfillment of his own purposes, some the result of forces and purposes which he does not control. All of these aspects of the individual must be observed, in their relations to each other, if an

insight into the meaning of individuality is to be obtained. An individual can be understood only by examining him from all of these viewpoints.

Making now a division of subject matter for the purposes of observing differences of individuals, there appears to be a sharp distinction between traits of mind, and traits of body. Both the body and mind seem to be made up of parts or functions so joined that, although they can be observed separately, there are many relations among them.

Both common observation and scientific study show that in bodily traits individuals differ greatly; this is certainly true of all parts of the body that can be observed, and anatomists and physiologists declare that differences are quite as great in those internal parts that are concealed from ordinary observation, even in the minute structures and processes that can be examined only by the microscope and by chemical methods.

The most casual observation shows, too, that there are many and great differences among individuals in their mental traits. The mind like the body seems to be made up of parts that can vary independently of each other; and yet, though all combinations are thinkable, some appear to be found more frequently than others.

Not only when viewed in this analytical way do individuals appear to differ, but when they are considered synthetically with reference to their personality as a whole, and to those aspects of it which they present to us in the practical relations of life: their values and efficiencies: aspects of the individual in recognition of which we have a rich vocabulary of description, approbation, and disapproval.

Lastly, from that point of view which we take in regarding an individual as a series of concrete events, the greatest differences of all are found, some of which we can understand by referring to the traits of the individual, or to the logic of events in which he participates, others of which seem to be mysterious dispensations of Providence or the result of fortuitous combinations of circumstance.

The study of individuality then is no mere observation of the likenesses and differences that appear to superficial view, but it is a complex problem, a part, on the one hand, of the biological problem of variation, on the other related to problems of general psychology, ethics, and sociology. Variation in the human species is presumably subject to the same laws that prevail in producing variability elsewhere; but the complexity of the human organism makes the study of human variability peculiarly difficult. It would be suspected at the

outset that the study of an object so complex as a human individual would be beset with many difficulties, and in the actual pursuit of it that suspicion is not likely to be proven unfounded. If we examine the causes that produce individuality the explanation of the complexity of the problem is soon found. Two great divisions of fact must be considered; the factors of heredity and of environment. Each individual is a product of two long lines of ancestry; he is a mixture of elements derived from both, a sum of innumerable factors. But he is not only a complex organism, but a plastic one, and environment at the earliest moment of life begins to play a part in still further establishing his individuality. The human being, having both greater complexity of structure than other species, greater plasticity, and a longer period of infancy, and at the same time being influenced by a more complex environment, becomes finally the most individual of all creatures.

But this process of creating individuality has not ceased with our present state of society but goes on continually and as specialization increases in modern life individuals tend apparently to become more complex, and at the same time, to differ from one another in more ways. An estrangement of individuals from one another and an increasing difficulty of mutual understanding therefore go hand in

hand with the increasing coöperation that is more often noticed as the result of social progress. This increasing individuality has both advantages and disadvantages, considered from the standpoint of the interests of society. Greater specialization makes for greater efficiency and a social life richer in possibilities of moral and social progress; but it also, by isolating the individual, increases the difficulty of his personal problems, and in dealing with others he tends to lack more and more adequate knowledge of them. No doubt the increasing estrangement from our fellows is in part compensated and overcome by the increased definiteness and specialization of our relations with them, but the fact remains that in many departments of life there is a growing necessity for a better knowledge of individuals and better methods of studying them. The result is that the study of the individual is itself becoming a specialty, and the specialist comes to mediate between the practical worker, and the object of his labor. Indications of this movement are to be found in education in the development of the research department and of the psychological, medical, and anthropometrical specialist. In the profession of medicine a class is coming to be set apart for the special work of scientific diagnosis, more exact than can be carried on by the busy practitioner. It is shown in literature by the rapidly increas-

ing interest in biography as a form of literature: and in all the sciences that deal with human nature there is a trend of interest toward the problems of the individual. Stern has declared enthusiastically that individuality is to be the great problem of the twentieth century; it is certainly one of the fields in which scientific research is likely to be active in the near future, for many interests seem to be converging to a center in the study of the problems of the individual, both in their practical and their scientific aspects.

REFERENCES

If one wishes to enter into philosophic questions of the nature of individuality works like The World and the Individual, by Royce, and Social and Ethical Interpretations in Mental Development, by Baldwin should be read. These are profound and systematic works and are intended, it is presumed, only for the serious student. No better introduction to the biological problems of variation can be found than Darwin's Origin of Species. The articles of Pearson and others published in Biometrika will be interesting to those interested in the mathematical aspects of variation. Some of the best literature of individuality was written without intention to throw light upon its scientific problems. The reading of biography will be an excellent accompaniment to observation and experiment. Autobiographies like Herbert Spencer's, and such books as Amiel's Journal, the Confessions of Rousseau, the Journal of Marie Bashkirtseff are ex-

cellent portrayals of types of human character. Books that contain studies of national characteristics are helpful. Fiction is valuable but to a less degree, for though its characters may be vivid they are often untrue to nature. The study in detail of the work of anyone who has expressed himself freely in any artistic or literary form, is a study in personality. Books and articles that pertain directly to the study of individuals are numerous; they are written in many languages and from many points of view. A few that seem most important or that are most readily accessible will be mentioned in connection with special topics.

II

INDIVIDUAL-STUDY AS A SCIENCE

The study of individuals appears to be one of the great scientific problems of the day, related to and involved in the work of various sciences, that have for their purpose the investigation of man. There are many special problems of individuality, but the whole subject can be brought for discussion under four general topics: (1) The description of individuals, including analysis of the organism into its variables and the measure of these variables and the correlation among them; (2) Study of the causes and conditions of differences among individuals such as heredity and environment, and the study of the genesis of traits in the individual and the race; (3) Diagnosis of in-

dividuals, that is, the development and use of methods of testing individuals to discover their characteristics, abilities, and standing; (4) Application of these results to the practical treatment of individuals; that is, the development of an individual pedagogy, using the term in a wide sense.

The first, or central, problem of individuality is the descriptive, a problem that is likely to engage the interest of investigators for a long time to come. There are already many conflicting standpoints, for the individual is a meeting place of many interests. A complete descriptive science of the individual must include:

(1) Analysis and measurement of the individual regarded as a complex of variable traits; the establishment of norms or standards for each of these traits or elements and the manner of variability of the traits about their norms. This must include the study of both mental and physical traits. If psychology and physiology were sufficiently advanced so that these elements were known this problem would be comparatively simple, but this is by no means the case, and it is possible that the general sciences of psychology and physiology will never supply this want. The problem of description is still further complicated by the manner in which variables enter into apparently inextricable combinations with each other.

Always therefore with the isolation and measurement of the elements must go investigation of the relations between them, of the manner in which they are coördinated to produce combinations or types.

(2) It has already been shown that this method of approaching the study of individuality is not entirely satisfactory; partly because the analysis of the individual into elements and the measurement of the elements is an ideal not to be reached in actual practice, but also because this method of study leaves out of account entirely some of the most distinguishing traits of individuality. Methods must be devised for studying the individual from the standpoints of practical life, and of the sciences of ethics and sociology. The essential variables of those qualities of the individual that represent or constitute his values in relation to his fellows must be discovered, and methods devised for observing and completely describing them.

(3) The life history of the individual must be described; that is, he must be studied from the biographical point of view, with reference to the most determining events of his life. For this point of view, too, there is as yet but imperfect preparation in the general sciences of human life. Something can be derived from ethics, from the study of religion, and social science, but all must be adapted to the study of individuals. The essential events of the lives of

individuals must be determined with reference to the meaning of life as a whole so far as we can know it from our limited human outlook upon it. This in a sense is the metaphysical attitude toward the problem of individuality.

A second step always follows the descriptive phase of a science; the explanatory. The second problem of individuality is the investigation of the relations of differences among human beings to other facts, and to other laws. This means a study of the causes of differences, the working of the laws of evolution, genesis, and variability to determine how they produce types and differences, in what direction differentiation of types is proceeding, the effects of environment, the relations of genesis of traits in the individual and in the race. The development of characteristics in children must be observed and recorded; the forces that have produced differentiation must be studied in retrospect by the adult. Finally the whole subject must be interpreted in the light of the unified views of life that are obtained in the philosophic and other sciences.

The third problem of individuality — the diagnostic — involves the application of knowledge derived from descriptive and explanatory studies of individuality to the definite practical study of particular individuals. When types and varieties are known, and norms established, and the relative importance of characteristics,

and their dependence upon one another are determined, methods must then be devised for discovering the essential traits of any individual as quickly and as simply as possible, in order to understand in a practical way, his abilities and values, to predict reasonably his future, and to have a basis for rationally controlling his life. That such a diagnostic of individuality must wait for the development of description and explanation seems inevitable; yet in a way this is the most pressing of the problems of individuality. It is the task that has often been taken up in mental-test schemes and other methods of diagnosing individuality, all of which have failed or have been unsatisfactory largely because they have made the error of supposing that the characteristics which they attempted to test were better known than they actually were. This is precisely the problem of the old phrenology, which divided the individual into a score or two of definite traits, and tried to determine the degree in which he possessed each of these traits by observing the size of the skull compartment in which they were supposed to be represented. The scheme was very simple, but it ignored the fact that even the most fundamental traits were but imperfectly known and that they must be known before the individual could be tested. Other attempts to make practical systems of diagnosis like palmistry, chirography, and as-

trology (which pretends to find the signs of character not in the individual himself, but in the stars) are to a greater extent guilty of the same errors. Eventually there will be a diagnostic that will be both scientific and practical. When characteristics are sufficiently well known simple methods for studying those that are most central to individuality can probably be devised. Whether the ideal of a short, perfectly simple, and accurate means of measuring or psychographing an individual will ever be reached it is difficult to say. Any such system would, in the nature of the case, be a makeshift, a substitute for more detailed knowledge, but it is likely that in time it will be possible, by a fairly brief examination, to discover the most essential traits of a person, and that the methods will be simple enough to be applied generally in practical examinations for all kinds of advancement and appointment, and for various uses of education and medicine.

The fourth problem is the practical one of applying knowledge of individuality in general and the result of tests to the practical control of individuals. There are two problems involved: (1) To discover or to decide upon that which it is desired to accomplish for an individual, decisions that are determined partly by knowledge about the individual, and partly by the ideals of the society in which he lives; (2) To discover the best means of reaching the de-

sired end, that is to construct an individual pedagogy. Both of these problems are interrelated in various ways with the problems of general pedagogy, but they are also individual, and must be treated with reference to the facts of variability among human individuals.

Such, briefly stated, is the ideal of the science of individual-study. Every science tends to pass through stages similar to those mentioned; descriptive, explanatory, and finally the stage of application and practice. These steps represent, it is true, an ideal course of procedure. Actually, the process is more complex and confused, for the advancement of a science is not determined by a consensus of opinion, but progress is made by more or less detached and independent efforts. In a general way, however, a science proceeds from the descriptive stage to the explanatory, and then to the practical.

III

THE VARIATIONAL METHOD

The descriptive problem has been shown to be the central problem of the study of individuality. Individuals must be described before the causes of their differences can be understood, or practical consequences deduced.

Individual-study is also seen to be more than a mere observing of superficial traits of body and mind. The individual as a whole must be studied in all his aspects, from the standpoint of all the sciences that deal with human nature, and from all these sciences methods must be drawn and modified to meet the special requirements of application to the study of individuals. It so happens that in nearly all the sciences of human nature a strong current of interest has turned, in recent years, in the direction of the variational or individual problem. The recent interest in numerical problems of biology, which has become an important phase of that science, will illustrate the general trend. Variability is being measured not only for all important traits of the human body, but of plants and animals. Almost all the conspicuous traits of the human body have already been so treated, and the method has even been applied to some mental characteristics. Pearson thinks that all traits, when accurately enough measured, and a sufficient number of cases are taken, will show variation around a norm, according to the law of probability, and that discontinuous variation and types are, for the most part, due to insufficient number of cases, inexact methods, or imperfect analysis of the characters to be studied: that discontinuous variation, if it exists at all, is so infrequent that it can be neglected in theory. He thinks,

too, that every idea of Darwin, such as variation, natural selection, sexual selection, inheritance, prepotency, reversion, seems capable of exact mathematical definition and statistical treatment.

The anatomical problems of variability are much further advanced than others and we now have a fairly good numerical account of the main features of the external configuration of the body: some work has also been done in the study of variability of internal organs, and the correlation of one organ with another. Measurement of the body has been a problem of interest to two different classes of workers, biologists and anthropometrists, the latter working especially in the interest of practical application of measurements to the physical training of youth, and also studying racial differences.

In physiology, work along variational lines is less advanced although many studies have been made of the more accessible functions, such as respiration, circulation, metabolism, temperature, tonus rhythms in muscles, rapidity of nerve impulse, secretion and excretion.

Pathologists naturally approach their problems with some conception of types and variation. Already, true variational methods and conceptions are beginning to change the methods of studying disease and of regarding disease processes. There is a growing change

of viewpoint in the direction of regarding the variation of physiological functions from the normal rather than the presence of germs or disease processes as the main factor in the production of diseases. On this consideration the constitution of the individual as a whole, and his life history are taken into account, rather than the habits and life history of the germ, or the microscopical examination of the pathological process. Individuals must be studied, in order to satisfy this new turn in pathological research; they must be regarded as members of a group, as a sum of variables capable of departing in all degrees from a norm or average. So in branches of medicine like psychiatry we hear much about the physiological activity of cells, changes in irritability, causing cells to act more slowly or more sensitively, and in other fundamental characteristics of living matter. Pathologic types are explained as the result of departures from the norm in the few elementary variables, and in the manner of their combination.

Other organs and functions of the body than the nervous system are coming to be regarded in this same way. Kraus and Martius, for example, have been studying types of efficiency of heart and stomach; and thoughtful physicians look forward to the time when a complete description of a man in terms of functional efficiency of his parts or physiological systems,

including his conscious adaptations, will be possible. The great advantage of such a conception for the physician is obvious; it would enable him to study in cases small departures from normal activity, to trace the development of individuals toward abnormal functioning, and to understand in their origin and as they appear in small departures those disease types that later appear in pronounced form. This would include the study of those diatheses that are the foundations of physical diseases, and the types of constitution that result in mental disease: such as the psychasthenic, neurasthenic, hypochondriacal, hysterical, epileptic, the deterioration type, the maniacal, paranoiac.

Within psychology proper the development toward what has been called the variational method or study of individual differences has appeared in many departments; though the studies are as yet fragmentary and the actual results meager, and there is wide divergence among psychologists in their conception of the whole problem, there is here the clearest notion of a science of individual-study, and the most promising state of interest. The following chapter will relate, in some detail, the history and present status of the variational method in the field of general psychology.

The same method of attacking problems is on the increase also in the special psychological and philosophical sciences. In the science of

religion comparative methods are being used, not only in the study of racial types of religious beliefs, but in the investigation of varieties of religious experience among individuals. In ethics, too, similar lines of attack are appearing.

In ethnology the study of differences in traits among races of mankind necessarily adopts the conceptions of variability; the ethnologist is particularly interested in discovering those traits that are least variable, and so of most value in classifying the human species into varieties.

In sociology the problems of variability are at the front. Questions of the formation of national types, the study of traits of various social and economic groups require the conception of the problem that has been called the variational, and the interpretation of the facts in accordance with the general laws of evolution. Besides these normal groups, the criminal, and the socially defective generally, must be studied as members of a variational series rather than merely as diseased or abnormal persons. The victims of alcohol, the unfit, and the vicious of all kinds must so be considered.

Thus it is seen that all through the sciences that deal with human nature the biological conception of variability applies, and that methods are being worked out which, though specially applicable to the use of special scientific problems, have a common ground. These methods

need to be brought together and considered with reference to their applicability to the study of individuals as such in a systematic manner.

The methods that have thus far been applied to the study of individuals can be grouped into four classes: (1) Medical and physiological methods; (2) Anthropological methods; (3) Psychological methods; (4) General observation and pedagogical methods.

From the medical interest in individuals a science of diagnosis has arisen that has gradually been extended into new subjects, until now the medical methods of examining individuals form one of the most scientific aspects of the subject. Chemical and physiological methods have been worked out for measuring and testing physical functions, some of them adapted merely to discovering the presence or absence of disease, others suitable for testing normal functions, and measuring variability. Medical diagnosis has extended to the mental life, and the study of types of mental disease and deficiency has led to more or less complete schemata for the study of the normal mental life, especially the temperament, the emotions, and habits. A thorough medical examination now, at its best, includes a broad examination of an individual and comprises investigation of both mental and physical functions.

From the anthropologists have come methods for exact measurement and description of physi-

eal conformation, and of some mental traits that are distinctive of racial types. Anthropometrists have developed and refined these methods and applied them to the problem of physical diagnosis and to the measurement of development of normal and abnormal individuals.

Psychologists have supplied many methods for the study of individuals. Their first attempt was to devise a short series of tests or experiments based upon the divisions of mind made by analytic psychology, with the expectation that these tests could be used in analyzing an individual completely enough for practical purposes. It was soon seen that these methods failed to strike at the essential traits of the individual, and attention was turned rather to the more complex functions, using methods in part new, and unknown in general psychology, and in part adapting methods of general psychology to the requirements for studying individual differences. This work has been partially successful in establishing methods that have some practical bearing and at the same time are exact enough for the purposes of scientific investigation. Meantime the whole problem of individuality has been seen in larger ways and now the aim of psychologists is to attack the problem systematically and to devise methods for a complete description of mental traits; that is, to work out a science of psycho-

graphy or descriptive method for the study of all those characteristics that can in any way come into consideration in the study of individuality. Materials for such a comprehensive methodology are scattered throughout the literature of general psychology, and methods that have been used in general problems can readily be adapted in many cases to the study of individual differences. Many of these methods require complicated apparatus, and such facilities as can be had only in a laboratory supplied with electrical equipment.

Into a fourth group can be placed those methods that have been employed in the study of individuals in the moral and social sciences, for the purposes of education, and also those methods that have been worked out from the standpoint of biography. They are largely observational methods and they are but little coördinated or developed, but they represent attempts to approach the study of the individual from those wide standpoints in which he is regarded in his social and ethical relationships, and as a unique person.

All these various methods must eventually be incorporated into a descriptive science of individuality which, from the nature of the case, cannot be confined within the limits of any present science, for both mental and physical traits must be investigated, and no way of regarding individuality must be neglected in a complete

descriptive scheme. Yet, for reasons that are readily discoverable, the study of individuality is more closely related to psychology than to any other science. In the past most of the theoretical formulation of individual-study and most of the outlines for procedure have come from psychology. For this reason, it is important to trace at some length the history of individual or differential psychology; and finally to examine the claim of psychology to be the foundation of the science of individuality.

IV

STUDY OF INDIVIDUALITY WITHIN PSYCHOLOGY

The history and present status of the problems of variation and individuality within psychology need special attention, for it is in psychology, as has been said, that the problem of individuality seems to center. There has been, and is, in psychology great diversity of opinion with regard to the whole matter of individual-study. Over some of the fundamental conceptions there is still confusion, and even plain contradiction. The main differences of attitude can be disclosed best by considering briefly the work of German, French, English, and American psychologists, with special reference to the experimental investigation of differences.

Exact work in differential psychology appears to have begun with the work of Kraepelin and his school. Kraepelin was led to the study of normal mental differences by the study of insanity and nervous diseases. In order to analyze the constitution of certain types of defectives which he thinks are different at the very beginning of life, he is brought to the differential study of various traits of normal people. His study of the fatigue curve is an example of the method, and is an instance of excellent results in the investigation of individual differences. He succeeded in isolating several factors of fatigue, each in itself independently variable, and in establishing norms and types, with which the abnormal can be compared.

Oehrn's work, done in Kraepelin's laboratory, was one of the earliest contributions to individual psychology, and was a product of the conception just referred to. His aim was to obtain norms for some of the common mental processes, such as letter counting, search for certain letters, learning of digits, marking incorrect spelling, adding of single place figures, writing from dictation, reading at maximal speed — and then to compute the relationship of these activities in the individual, and, if possible, to discover mental types. Although the actual results were not so conclusive as could have been wished, the method itself seems to be promising.

At the present time the most comprehensive study of individual differences in Germany is being made by Stern. He, too, approaches the subject from the standpoint of general psychology. The descriptive problem, he maintains, comes first; we must first find the differences before they can be studied in any other way. And in order to discover them a beginning must be made with the simplest mental functions such as have been discovered by general psychology; then variations in the working of simple psychological laws must be investigated; the arrangement of simple elements into types, and the simple types into more complex types must next be known; and finally insight into individuality itself, which is a combination of types, must be obtained. It would be hoped that a few elementary variables could be found, the combination of which produces the complex differences of individuality. Two methods are allowable in investigating types: (1) By finding out how the elementary functions vary together, new types will be discovered; (2) by analysis of such types as are already known, variables among elementary traits are to be discovered. There are many ways of approaching the whole problem of individuality, and among them, according to Stern, six promising methods: (1) Self-observation; (2) observation of others; (3) study of literature; (4) study of civilization; (5) syllabus method; (6) ex-

periment. The most promising of these, he thinks, is the method of experiment, and he proceeds to outline methods for the study of individuality based upon the achievements of general psychology; although, as he soon discovers, the methods of general psychology must be adapted to these special purposes. At some points present psychology seems to him to be adequate for the study of individual differences; at others it seems to be of little service.

Turning to the study of individual psychology in France, a different point of view is found. The French literature of the subject is rich in attempts to classify characters, but these studies, for the most part, have not led to systematic investigation. They have, however, determined apparently the standpoint of individual psychology in France. Paulhan's system of character-study needs, perhaps, special mention, though it represents the older deductive kind of work, rather than the experimental. Paulhan bases his classification of characters upon principles of philosophy. An individual is made up of both concrete and abstract elements. The concrete traits or elements are those to which descriptive adjectives are applied: these elements combine according to psychological laws, and the combination of elements accounts for the abstract elements. Characters are classified according to four main characteristics: (1) The degree of coher-

ence of a character and the nature of the association among the elements; (2) the form of the elements and of the mind as a whole; (3) the presence or absence of particular elements; (4) the manner in which the elements act together as a whole; their subordination one to another.

Ribot also approaches the study of individual difference from the consideration of the individual as a whole. "There is more in the synthesis than in the analysis"; and the most distinguishing traits of an individual are just those balances of function that can never be reached by the study of elements. Therefore the methods of studying individuals are not the same as those employed in investigation of the problems of analytic psychology, but must be directed to the study of the more complex functions.

Experimental psychology in France has followed out these suggestions, considering the individual as a whole rather than as a sum of items. By far the most important work is that of Binet and his school. They have been studying variability and correlation for many years, and have gradually been perfecting tests that they think will enable them to make a comprehensive psychograph or mental diagnosis of an individual. Their method has been to study the traits that most characterize a person in actual life, in order to discover those central

variables with which other traits of the individual are connected. The order of procedure has been to study many qualities in one or a few persons, or a few qualities in a large group. Some of the results of these methods, for example Binet's comparative study of the intelligence of two children, are very valuable contributions to the psychology of mental differences.

The psychological studies of individuality that have been made in England, and also in America, have been dominated or greatly influenced by what may be called the phrenological idea; that is, the hope of finding some simple tests by which the individual may be measured and the result of which will stand for a description of him adapted to practical use. Although phrenology did not originate in England, it seems to have taken firm root there and to have influenced some of the best thinkers; for example, Spencer, Mill, Bain, Wallace. All of these discuss the subject and Wallace maintains that the neglect of phrenology is one of the great sins of omission of the nineteenth century. Both in England and America elaborators of the work of Gall and Spurzeim have made attempts to classify mental characteristics, and to show the interaction of traits in the formation of character. Sizer and Drayton's "Heads and Faces" is a good example of this kind of work. They begin with a modified

form of the ancient doctrine of temperament, finding three great systems in the individual; the motive or mechanical, the vital, and the mental or nervous. They then proceed to describe the characteristics of the temperaments in which these systems respectively predominate.

Mill, in his "Logic," outlines a theory of ethology or science of character, dividing the subject into two parts: (1) Dynamic ethology, or the science of character forming; (2) static ethology, or the science of individual differences. Galton has followed out both these lines of research and has contributed to the subject brilliant investigations of differences, their causes, and mathematical methods of treating data.

The American studies in this field center about the problem of mental tests. Although considerable work has been done on this subject, the investigations have lacked coördination, and at present there are rather conflicting results. Nearly all the numerical results, both of American and foreign investigators, are just now under the ban of higher mathematical criticism, for reasons soon to be mentioned. The American studies include investigations like those of Gilbert, Cattell, Seashore, Thompson, Sharp, Miles, Thorndike, the World's Fair tests, Muensterberg's tests — all dominated by the desire to obtain practical measurements of in-

dividuals. The difficulty that confronts this method is now well understood; the " simple " processes that are examined are themselves complex, and numerical results, when obtained, do not sufficiently represent psychological states or functions. When, therefore, attempts are made to study correlation among mental functions, the full difficulty comes to view. Results are conflicting, but nearly all investigators have failed to find much correlation among the functions that they have tested. Smith, for example, reporting in Thorndike's " Heredity, Correlation, and Sex Differences in School Abilities," studied the relations between abilities involved in grammar school subjects and found no great degree of correlation among them, or among the various abilities demanded in the same subject. Other studies by Thorndike and his pupils tend to show that the abilities used in school subjects are decidedly unrelated, independent and specialized. Seashore found but little correlation among traits; Bagley denies all correspondence between motor and mental abilities, except antagonistic relationships; the studies of Cattell, Farrand, and Wissler are negative, and Sharp found but little correlation in a long series of tests of various functions.

Into the midst of this discussion now comes Spearman, with a remarkable investigation based upon mathematical methods of studying

correlation, which tends to show that the failure to discover correlation among mental traits is due to lack of understanding of mathematical methods of handling data. His problem is the investigation of correlation between various kinds of sense discrimination, and general intelligence as represented by school work. He examined small groups of school children, testing discrimination for sound, light, and weight. In estimating intelligence he used the ordinary school grades based upon examinations, the difference between each boy's rank in school and his rank in age, the common sense marked by the oldest pupil, the next oldest, and an adult. He then proceeded to estimate the correlations among these two series of gradings; that is, to measure the common element or factor that enters into the ability to make sense discriminations, and the general intelligence. He proves that there is a factor common to all of the discrimination functions that were tested, and also a factor common to all the intelligences represented in the various methods of grading. Moreover, this common factor in all the discriminations coincides exactly with the common factor in all the intelligences. What this factor is, psychologically, he does not attempt to decide; it may be simple or it may be complex.

If now Spearman's method is valid, there is decided correlation among mental abilities, and

the conclusions of many, especially among American investigators, are wrong. The chief contribution of the American differential psychology, and it is a considerable one, seems to be the experimental methods that have been devised or applied to the study of differences; some of them no doubt crude, but serviceable in the long course of preliminary work that is yet to be done in the psychological investigation of individuality.

The differences in standpoint that are found in the psychological studies of individuality, though somewhat perplexing, do not indicate lack of progress in the subject, nor a permanent state of contradiction. They seem for the most part due, not to mistakes and wrong conceptions of the problem, but to the complexity of the subject. This is a condition that almost invariably arises at the beginning of a new development of science. The new problem proves to be larger than those who make the beginnings perceive, and the narrow schematization that seems necessary at the outset soon gives way to a broader conception of the problem. Unexpected complications arise, and it is soon seen that many methods must be tried, and many preliminary investigations made, before exact work can be done, or a clear view ahead be seen. The study of individuality is in the stage of preliminary investigations, when we are just beginning to see that it is no mere

problem, or branch, or method of psychology, but a broad field for scientific research that lies before us; a field in which all methods must be made welcome, for the study of individuality is a meeting place of many sciences, and its attitude must therefore be cosmopolitan.

REFERENCES

There is as yet no complete summary of the history of individual psychology, but it must be studied in scattered articles in the psychological journals. Partial summaries of methods and pre-suppositions are contained in articles by Sharp, Huey, and more recently Spearman in the American Journal of Psychology. Ribot, Psychology of the Emotions can be consulted for some reference to French studies of character and temperament. Spearman's Article on General Intelligence (American Journal of Psychology, April, 1904), should be read.

V

INDIVIDUAL-STUDY FROM THE BIOLOGICAL POINT OF VIEW

The review of the present conceptions of individual-study and its history demonstrates at least two facts: (1) that the study of individuality reaches beyond the limits of any one science; (2) that there is at present no conception of the problem of individuality that is

capable of bringing order among conflicting views, or of serving as a working hypothesis to unify the subject. Yet this seems to be necessary, if progress is to be made.

It has been seen that most of the suggestions for a science of individuality have been derived from psychology; and rightly, for it seems true that the mind of a man is the most essential part of his personality, and psychology has succeeded in making at least a partial analysis of mind into its elementary processes. Some think, in fact, that the study of individuality is a branch or method of psychology. But this seems to be too narrow a view; for physical differences must be taken into account as well as mental differences. And besides, the study of mental traits does not belong entirely to psychology, for the individual is more than a complex of mental states and processes; he is a self-conscious person, a social unit, a body-mind mechanism related to the whole history of the race.

The question arises whether some point of view more fundamental may not be taken from which the subject of individual differences can be approached more broadly than by conceiving it as a psychological problem, yet in which psychology shall be the central viewpoint. If psychology is still to be retained as a basis for the study of the individual, is there any way of looking at psychological problems which will

at the same time take into account the variation of physical traits and the relations of the individual to the history of the race and to the society to which he belongs; in other words in accordance with the conception of progress by variation?

In accordance with this broader conception of individual-study, if it is possible to take it, the first principle that must be laid down is that body and mind have evolved together in the race and have developed together in the individual; that, therefore, both objective and subjective methods must be employed; that physical and mental facts are to be placed theoretically upon equal terms. If such a psychophysical standpoint is accepted as a working hypothesis, other principles follow. It will be necessary to consider first the simple functions, both mental and physical, among the lowest forms of life, and to see how these elementary traits can vary. Even the single-celled animal carries on a life process in which all the higher processes are already represented. The single cell can vary in movement, form, growth, and reproductive processes. Processes of assimilation, respiration, circulation, elimination, and irritability appear at the outset. Naturally then one would look for fundamental variables among these simple functions. Here one would search for light upon the physiological basis of temperament, and other characteristics of

the individual that are most obviously connected with physical traits.

In the evolution of the race, the characteristic known as irritability soon emerges as a significant trait of the animal cell. It becomes pushed ahead by selection, becomes highly variable, and the seat of those distinctions and selections that are called psychical. When therefore the higher traits of the nervous system and the mind are studied, we must try as far as possible to connect them with variations in fundamental processes, such as irritability, which can reasonably be supposed to underlie them. In this way must be considered fatigue, recovery, reflex activity, and many qualities of the mental life, especially the more general characteristics of emotion, mental tonus, and mental tempo. Consciousness so considered is the reverse side of a complex of physiological traits; now we have a glimpse of the physical, now of the mental, but it must be remembered that the two series of facts belong together.

The nervous system is essentially a mechanism by which impressions are coördinated for the purpose of producing movements. In its primitive form it is a sensori-motor cell in which the functions of sensation, or its physiological equivalent, and motion are carried on together. The two functions become separated and gradually increased in complexity by the interposition of connecting elements. But the

type of action is not changed. However complex may be the functions of the human brain they are but the result of summation of the simplest reactions, and the highest conscious processes are not different in kind from the lowest. Complex differences in the psychic field must be interpreted as correlates of variations in afferent-motor processes.

The nervous system, then, is a mechanism for securing coördination in such a way that one element may act with another to cause a unit in function where morphologically there are separate structures. This is the type of all psychophysical reactions, and it is secured in two ways in the individual; (1) by the development of innate coördinations; (2) by associations due to experience. Variable factors in these two fundamental forms of coördination must be investigated therefore as a preparation for the classification of differences in the higher processes of the mental life, and the higher processes must so far as possible be interpreted in terms of these fundamental variables. So understanding the mechanism of the nervous system individuals can be studied with reference to the two types of coördination that have been described.

In considering differences among individuals the native coördinations would be considered first, regarding the acts that result from them as primarily body-mind adjustments in situa-

tions that are or have been practical in the development of the race. Here indeed is the central point of the theory of individual-study. The most practical point to observe is that on this consideration the most determining traits of individuality are to be sought, not in the higher sentiments and their manifestations in conduct, but in the simple reactions, the primary instinct-feelings; variations in which, if the biological hypothesis is correct, determine largely differences in the higher or more complex traits of the moral, religious, social, æsthetic, and practical life. Many other traits of the individual such as characteristics of interest, attention, and habit must be examined also with reference to variability of the primary instincts, and it is reasonable to expect that when a few basic traits are thoroughly understood, many differences in human nature otherwise inexplicable will be explained. To what extent these differences will be referred to their physical correlates it is impossible to know; but it is to be expected that many relationships between these mental differences and underlying physical conditions will eventually be made out; that differences in excitability of nerve tissue, in supply of blood to tissues, traits of metabolism and the like will be found correlated with differences that are discovered by subjective methods and by observation of activity.

Coming now to the phase of consciousness

that is represented by the acquired brain connection, we must begin again, if possible, with a central characteristic or elementary process, which seems to be associative connection. Again, it is the general characteristic of mental habit, rather than content of consciousness which must be examined for clues to the most determining mental differences. The simple reaction arc, that is made up of impression, movement, and return of the impression must be examined to detect its essential variables, regarding it as a practical function, and the type of all mental activity. We need not follow out the details of this process of associative connection, and the manner in which the selective process that is inherent in it gradually produces a connected stream of consciousness in the individual, and directs it to practical ends, but it is sufficient to point out that the central problem of intellectual differences is the analysis of this process of associative connection into its variable elements, and to trace the connection between the more complex difference in mental activity and these. Only when, on this hypothesis, the explanatory powers of the simple principles fail need others be resorted to.

This statement of the theory of mental differences is of course but the barest suggestion of an outline but it will serve the purpose of showing how an hypothesis can be constructed

that shall take into account both the physical and mental aspects of individuality in the same conceptions. The proof of the value of such a working hypothesis would be found in the actual use of it. That such a method is more comprehensive and better suited to the purpose of individual-study than that which is based upon analytic psychology there are many indications. For this psycho-physical view examines the individual as a whole, as a member of a biological series and in relation to the development of individuality in the race. It brings to the foreground and puts into their proper place the instincts and emotions, and makes the differences among their most general characteristics the foundation of personality; and it emphasizes the social and ethical aspects of individuality which are closely connected with the primary instinctive reactions. It connects also with those biographical methods which must be used for the description of the individual with reference to the most important events of his life; for the events that are most determining in the life of an individual are those usually that profoundly affect some fundamental emotion and its expression in conduct or interest.

However one may approach the study of individuality, whether for the purposes of scientific research or for practical ends, some means must be adopted for bringing the subject into

order. This can be done only by considering the relations of the subject to the sciences on which it is based. It has been the aim of the preceding chapters merely to suggest these relations, and the attitude of mind one must take in considering how and why people differ from each other. Attention can now be turned to the actual methods that are to be used in studying these differences.

REFERENCES

References for reading in connection with this chapter would necessarily send one rather far afield in psychological literature. To understand the position of the naturalistic psychology upon which this view is based, one should read the articles on anger, fear, and other emotions by G. S. Hall, that have appeared from time to time in the American Journal of Psychology. The most systematic presentation of the subject is to be found in the works of J. Mark Baldwin; especially Mental Development in the Child and the Race can be read. Chamberlain's The Child contains most of the facts. Royce's Outlines of Psychology is written from somewhat similar points of departure. An article by Dewey, The Reflex Arc Concept in Psychology (Psychological Review Vol. III, 1896), contains the kernel of the psychological theory that has been worked out by Baldwin. James, Talks to Teachers is a more elementary treatment at least in part along the same lines. Kirkpatrick's Genetic Psychology is a recent exposition of these topics.

PRACTICAL STUDY OF INDIVIDUALS

I

METHODS AND DIRECTIONS

In the preceding sections an outline has been given of a science of individuality and its relations to other branches of knowledge. It can readily be seen that the way to a deep understanding of the problems of individual differences is a long one, but without some such preliminary study a proper perspective for the observation of individuals cannot be obtained. Yet individual pedagogy, like general pedagogy, considered as a practical art, stands in a peculiar relation to the scientific principles which underlie it. These practical arts cannot wait for sciences to be worked out: meantime individuals must be dealt with in some way, just as it is necessary to act upon some educational philosophy, in the absence of one that is thoroughly grounded in well-established principles. We do actually in our daily life study individuals, and we act upon the result of our observations, with something like conviction of the reasonableness of our actions. If it is tolerable to act upon our superficial or natural judgments, we seem to be justified in taking also whatever partially worked out principles science

already offers, and the methods that are readiest to hand, and may eke out our knowledge of individuals as best we can, make what hypotheses we are able about the causes of their differences, their significance and value, and the methods of dealing with them to the best interests of society and the individuals in it. Keeping the scientific ideals well fixed in mind, we can proceed to make as comprehensive a study of individuality as we can, and we have a right to call such study practical if by it power to understand individuals is increased, or if some reasonably safe conclusions are reached that can be applied to practical affairs. This is exactly the position the practicing physician finds himself in; in want of a complete and accurate method of making diagnosis, he must do the best he can, and proceed to act upon his conclusions. The clearer his conception of the ideals of his science, and the greater his experience with human nature, the greater his skill in diagnosis and treatment will be likely to be.

The methods of study and observation that are to be described apply especially to children of school age, and the point of view taken is for the most part the practical or pedagogical. The aim is to obtain as wide a knowledge of children as possible, including both physical and mental traits, using methods that require no

apparatus, or but the simplest, and whenever possible to suggest application of the knowledge that is gained to the problems of school and home.

For several reasons children from about eight or nine to eleven or twelve years of age are best for practice study of differences and types. Younger children are difficult to manage in experiments; they cannot introspect well, and they cannot write fluently. Older children are likely to have entered the adolescent period and to have undergone changes that tend to obscure for a time their permanent traits; and they have been modified by environment in a way still further to complicate the problem. A group of children of about fifty in number, having somewhat similar work in school, makes a suitable group from which to collect material for study and comparison of individuals.

It is not likely that anyone will have opportunity or desire to apply in detail all the methods of study that are suggested, or to observe a large group of children for a long time, as would be necessary to obtain materials of sufficient exactness for certain application. But one can easily make selections from the tests suited to whatever time and opportunity can be found, and perhaps make a fairly comprehensive study of a considerable number of children, that will have very practical results, and

perhaps in exceptional cases be of the greatest service to those who are studied. Much of the experimental work is planned to be educational to the child as well as to the observer. It puts the mind to test in ways that seem new to the child, makes use of normal competition, and appeals to a natural desire on the part of the child to know more about his own standing and ability. Children can readily be made interested in such tests, especially if apparatus is used, however simple it may be.

If study of a group of children is to be carried on for a considerable time, it is well to provide for each child an envelope or other form of file large enough to contain many samples of his school work, and the records of experiments and observations that are made upon him. It is better to save too much than too little, and anything that is written or drawn by the child expresses his individuality in some way.

In using these methods of observation and experiment in the training of teachers, it is probably best that the student should make as comprehensive a study as possible of one or perhaps two children; if two, children somewhat different in type should be chosen. These children must constantly be studied in comparison with the whole group, for it is for the most part by building up standards by observing the many that the one can be understood. All the facts that can be obtained about a child must

be studied together, in order to understand him as a whole or individual. For such study no exact methods can be given but much depends upon the student's power to see facts in relation to each other.

If considerable attention is to be paid to numerical results, records of the whole group that can so be arranged should be spread upon a chart, in which the data relating to one child will appear in a line horizontally and the records for all the class in any one experiment will appear vertically in a column. By this means facts become readily accessible for comparison, and for application of methods of calculation, if they are required.

It is not supposed that data gathered under the practical limitations of the school will be exact enough so that standards can be computed that will be of service to other experimenters, or that methods of studying correlation will usually be applied. There are however simple mathematical methods that can be applied to the study of correlation among the functions such as will be tested. Whenever in fact two traits or functions have been measured in such a way that the members of a group possessing them can be graded in a series with regard to excellence or quantity of the quality tested, simple methods of calculation can be applied to express the degree of correlation between those traits. To understand these

methods the work of Boas, Pearson, Wissler, and Spearman should be read. Although much of this literature is difficult and demands patient study, for the most part it requires no knowledge of mathematics beyond that usually acquired in a secondary school.

II

EXAMINATION OF THE HEALTH

Although the subject of diseases of children is a special science good health and poor health are such relative conditions, and bodily conditions and mental function are so closely dependent upon one another, that some knowledge of the most common affections of health is necessary for anyone that wishes to investigate individuality. Chronic conditions of ill-health and tendency to disease are so common in childhood that for practical reasons every child of school age should at least once each year be examined thoroughly by a competent physician. During the last few years there has been a growing conviction that the body of the child has been neglected in the school, and progress is now being made rapidly toward a school practice in which attention to the health will take a larger part. Thus far the best work has been done in testing sight and hearing, and in examining for some of the most prevalent

diseases that directly affect the intelligence of the child, such as adenoids. The mentally defective and the morally delinquent children have lately received much attention and are in a fair way to be more skillfully treated than in the past. In many cities tests of the vision and hearing of all school children are made once or twice each year, and in some cases physical examinations are carried out. Some practical method is now needed of obtaining a reliable examination of the health of every child, and of so recording his physical standing that the information can be used as effectively in the school as the report of conduct and class standing now is. Departments of hygiene and medical supervision, and departments of physical training are being introduced into school systems here and there, and it is likely that soon more complete information about the health of children will be in the hands of teachers, and a better provision made for the care of the health. Parents will usually coöperate willingly in any plan that can be shown to them to be in the interest of their children's welfare and the examination of health by school officials for the special purposes of the school could readily be made a part of the routine of education. In one city in which the experiment was tried a note was sent to parents requesting that permission be granted to examine their children. More than sixty per cent responded at once

granting the request, and many showed much interest in the work. Many cases of defective health were discovered that were before unknown either to parent or teacher. In about one case in five of all the children that were examined the health was found to be unsatisfactory. In many instances the causes of the physical inadequacy seemed to be obscure, and the need was constantly felt for opportunity to investigate more thoroughly and with the advantage of exact methods and laboratory facilities. This was true especially of cases of nervous defect in which a single examination could give but a superficial knowledge.

If the health of the child is to be examined some information must be obtained from the home pertaining to the history of the child and his heredity. Information about such topics as the following should be obtained and records made: —

Are the near relatives of the child — grandparents, parents, aunts and uncles, brothers and sisters — in good health? If not what is the nature of the deficiency in each case? If any have died what was the cause of death, and the age? Is there a marked tendency in the family to any disease, such as tuberculosis, nervous disease of any kind, rheumatism? Age of parents, number of children in the family and the age of each should also be known.

In general has the health of the child been

good? Has he ever been acutely ill, and if so with what disease? Does he frequently suffer from extreme fatigue or exhaustion, or show sign of nervousness? Are appetite, sleep, excretory functions normal?

If such information about the health of children is to be supplemented by examination by a physician some provision must be made for permanent records, and there should be printed blanks provided, to serve as a guide for the examiner, and to make the information uniform and readily accessible.

The medical examination would include observation about the general condition of the child, tests of respiration and circulation, examination of the abdominal organs, of the nervous system, observations for physical defects, tests of vision and hearing, examination of nose and throat.

Some of the conditions that the physician will frequently find are: General delicacy without definite disease, tendency to tuberculosis (as shown by enlarged glands, eye troubles, discharging ears), muscular weakness usually accompanied by round shoulders and protruding abdomen, various forms of nervous weakness and disorder, chorea, adenoid growths, enlarged tonsils, chronic inflammation of nose and throat, weakness of the lungs, irregular or overacting heart, heart disease, rheumatism, chronic skin disease, chronic indigestion, defective nutrition,

curvature of the spine and other physical abnormalities, defects of vision and hearing. On the whole, school life is a time of tendencies and constitutional weaknesses rather than of actual disease and the problems of diagnosis are therefore delicate and difficult. The ideal school physician is a man of broad experience in diagnostic work, and in the diseases of childhood. If the work is to be exact and thorough, laboratory facilities must be had for such work as the examination of secretions and excretions, blood analysis, and for exact methods for the study of the nervous system. The school in fact presents its own peculiar problems of diagnosis different from those of the clinic and general practice, and the work of the school physician needs special preparation, and special laboratory equipment such as is not yet generally available.

The most important part of the medical examination from the standpoint of the school, and the part that is most likely to be as yet puzzling to the general practitioner is the examination of the nervous and mental condition of the child. The school physician would be expected to give special attention to this subject. He would examine not only for the more common organic diseases that are seen in hospital and clinical work, but he would especially be on the lookout for neurotic conditions of all kinds, tendencies toward abnormal mental and

moral life, fatigue, eccentricity, and the like. He would aim to estimate the capacity and resistance of the child with reference to the work of the school. His examination would include enquiry into the habits and interests of the child, particularly in the case of very bright and very dull children, and all that appear in any way exceptional, either physically or mentally. Such work at the present time does not entirely fall within the interests or abilities of the ordinary practicing physician, and the exact study of the mental life of the child, from the standpoint of medicine, is the special work of the alienists, and even with them it is in its pioneer stage.

If expert assistance can be had in testing vision and hearing it should always be employed. If not, the ordinary tests that can be made by anyone after a little practice are decidedly better than nothing. It should be understood, however, that such tests are but approximately accurate, and that they are never to be regarded as final. These tests of vision do not discover all the defects of eyesight and it does not necessarily follow that a child should wear glasses if the vision is not normal. A record of defective vision however does call for further investigation by more exact methods, and such examination should never be neglected. The best chance of a correct diagnosis of the cause of defective vision and satisfactory

correction of it is at the hands of a medical specialist in eye diseases, an oculist. Some opticians are now experienced and well equipped with accurate appliances for measurement of the eye, and a good optician is better than a bad oculist. Tests of large numbers of children in several cities by means of the Snellen card or similar device shows that about one school child in five has subnormal vision, and needs therefore expert diagnosis by someone competent to decide about treatment of the difficulty.

In order that records may have value there should be recorded in every case; name of the child, age in years and months, sex, grade, school, date of examination, vision of right eye, vision of left eye. Note should also be made if the child wore glasses in the test and if there have been frequent headaches, inflammation of the eyes, pain, or strain, in looking or reading, these facts should be entered. The test is usually made by the Snellen card, which can be obtained from any dealer in optical goods. It should be hung in good light, not in direct sunlight, and the light should not shine into the eyes of the child but should come from the side or back. One eye of the child should be covered but not closed while the other is being tested. In testing the child is to read the letters on the card beginning with the largest, and reading the lines one after another. The best distance

at which to place the child is twenty feet from the card. The last line that can be read easily should be recorded. The method of notation is to make the distance at which the child stands the numerator of a fraction and the distance at which the last line that is read should be read the denominator. Thus if the child stands at twenty feet and reads the line that should be read by the normal eye at that distance the vision will be recorded as $\frac{20}{20}$. If he reads only so far as the line that should be read at 30 feet the vision will be recorded as $\frac{20}{30}$. The record should be made for each eye. Twenty-twentieths is normal vision; anything less than that is abnormal vision.

The hearing of school children has been studied by experts, and although the methods are not quite so exact nor so easily practiced as tests of vision they are practicable for the teacher, if a little study is given to them. There are several forms of audiometer that can be purchased from the instrument maker but fairly accurate tests of hearing can be made with a watch, preferably a stop watch; or with a little more practice, with the voice.

In the watch test the child stands with the side turned toward the experimenter. An assistant, or failing that the child himself, holds the end of a tape line close to the face below the ear. With the other hand he presses a handkerchief to the ear not in use. The watch

is held close enough to the ear to be distinctly heard and is then slowly withdrawn until a point is reached at which it is no longer heard. It can then be held at a distance quite out of range of hearing and slowly brought nearer until it is heard. By starting and stopping the watch several times while it is held at this position the correctness of the result can be confirmed. In making the record the standard to be used is the record of some one known by more accurate tests or otherwise to have normal hearing. For the numerator the distance at which the watch is heard by the child is used; for the denominator the distance at which it can be heard by the standard or normal ear. Each ear should be tested separately. Note should be made of frequent earache or discharge from the ear. Deafness is often intermittent or variable and usually a single test is not enough to establish the existence of good hearing.

Better than the watch test because it tests hearing over a wider range of tones is the voice method. The examination is made under the same conditions as in the watch experiment. If the whisper is used the experimenter first takes a deep breath and then breathes out as much as possible, holding the breath thus while whispering. With a little practice the test can be made with a fair degree of accuracy. For the ordinary purposes of the unpracticed ob-

server it is likely that tests with low spoken tones are capable of giving quite as good results. The child repeats after the experimenter each word that is spoken to him moving away until he can no longer repeat accurately. The value of the records depends upon the uniformity of the tests, and the conditions under which experimenting is done.

Such an account as the above of methods of examining the health of a child can of course afford but a glimpse into the vast subject of medical diagnosis; a subject which comprises several well-defined branches of science, and which is now pursued by the refined and exact methods of the laboratory in ways that can be fully understood only after specialization in these sciences. In practical work the greatest service of the amateur is to be qualified to detect indications of disease, and to direct the child to the proper persons for expert study and if necessary, treatment. Little has been said about mental abnormalities and diseases of childhood, but in the following chapters some of their signs will be examined. Below is given a report-form that can be used for the work of preliminary examinations of health: and also a special report-form for laboratory examinations of eye, ear, nose, and throat. They will show the ground that is usually covered in such examinations.

REPORT OF MEDICAL EXAMINATION

Name Sex Age School Grade
Birthplace Nationality F M Age of parents F M
Age of brothers and sisters B S
Heredity and health of family
Personal history
Height Weight State of nutrition
Pulse, Rate Characteristics Respiration rate, etc.,
Temperature
Chest
Lungs Inspection
Measurements Inspiration Expiration
Auscultation
Percussion
Heart Percussion
Auscultation
Abdominal organs
Nervous system Coördination Reflexes Movements
Muscular development
Skin Physical conformation

Direction to pathologist and special examiner.

Summary. Is health excellent, good, fair, poor, seriously deficient? Is there any marked disease or tendency to disease, and if so what are the present indications of its development? Does the child need medical or surgical treatment?

Directions to teacher or parent.

Date Examiner

SPECIAL EXAMINATION,

Eyes R L
Vision
Myopia
Hyperopia
Astigmatism
Ophthalmoscope and remarks R L

Ears
Watch
Voice
Tuning fork
Membrana tymphana, Eustachian tube, and remarks
R L
Nose
Throat
Does the child need medical advice or treatment?
Remarks to teacher or parent
Date Examiner

REFERENCES

L. E. Holt: Diseases of Infancy and Childhood. This is a large medical work written especially for medical students and physicians, but the general reader will find it a valuable source book in the subject of children's diseases.

B. Sachs: A Treatise on The Nervous Diseases of Children. Also a technical medical work but valuable for reference.

W. W. Ireland: Mental Affections of Children. A good introduction to the subject of mental diseases.

L. G. Guthrie: Functional Nervous Disorders in Childhood.

W. L. McKenzie: The Health of the School Child.

E. S. Talbot: Degeneracy, its Causes, Signs, and Results. A detailed study of degeneracy in the human mind and body.

Francis Warner: The Children; How to Study Them—and other books by the same author.

S. H. Rowe: Physical Nature of the Child.

Gulick and Ayres: Medical Inspection of Schools.

E. A. Kirkpatrick: Some Simple Methods of Rec-

ognizing Physical Fitness and Unfitness of School Children. Addresses and Proceedings of the National Educational Association, 1905, pp. 760–766.

III

OBSERVATION OF BODY CHARACTERISTICS

A chapter in the study of individuality that has as yet hardly been entered upon in a scientific manner is the analysis and description of physical traits, and the determination of their relation to mental characteristics. This is in part the problem of the old phrenology which tried to read character from the shape of the head alone, and of other pseudosciences such as physiognomy and palmistry that attempt the same task from observation of face and hand. All of these methods, it has already been seen, have failed to yield results at all trustworthy. But that there is a relation between physical form and mental trait there is no doubt, for our practical estimations of people are derived in part at least from judgments that are based upon the recognition of such fixed relationships. Not only are normal mental and physical traits thus related but already there is promise of discovery of relations between types of physical conformation and disease or tendency to disease and to criminality. This whole subject of relation of physical con-

formation to mental trait is yet to be put onto a scientific basis, and we have among the recognized sciences no successor to the old phrenology, except such beginnings as are being made by the anthropometrists.

The best attempt thus far to analyze the human face and figure seems to be that of Bertillon. The study was made in the course of devising a system of marking for the identification of criminals, and it is therefore somewhat special; but it furnishes some excellent suggestions for a more general study of individuals. The Bertillon system describes minutely the eye and the ear, and somewhat less in detail the other parts of the face and figure. Most of the suggestions that are given below for observation of the body are based upon the Bertillon method. Many of the traits that are to be observed are not in the present stage of our knowledge indications that can be used in diagnosing the traits of mental life, but a systematic observation of differences in physical conformation will train the observer of individuals in ways that will prove practical.

Observation of the body can begin with noticing the shape and size of the head. Is it large or small compared with the size of the body? Wide or narrow? Long or short? Has it any marked peculiarities of outline? The head should be observed from several points of view, all its outlines studied, and if possible sketched.

In this way, by making comparative observations upon a large group of children, standards will be established in mind that will serve as a basis of more exact work. Great variability will be found in the contours of the head, and many points for observation.

Qualities of the hair are regarded as important indications from the ethnological standpoint. Such traits as the following can be noticed: Color; blond, yellow, brown (light or dark), red, black. Is it straight, curly; abundant, thin; coarse, fine; lustrous, dull?

Skin. Is the amount of yellow pigment in the skin great or little? Is the sanguinity (the red coloring) great, little? Qualities of skin are indications, not only of temperament, but of condition of health. Its firmness, elasticity, smoothness, moisture, odor, color, warmth, fineness of texture all vary, and these qualities should be observed.

Face. Is it large or small compared with the size of the body as a whole? Is it wide, narrow? Seen in profile, what is the direction and contour of an imaginary line drawn from the forehead to a point where the upper lip joins the nose, and from there to the point of the chin? Estimate the angle between two imaginary lines, one drawn from the center of the opening of the ear to the point where nose and upper lip are joined, and the other from the last named point to the front of the forehead.

Study of this angle in many children will show that in a well-developed child the angle is usually a right angle, or nearly that, and the line from forehead to chin is nearly a straight line. A small facial angle and a strongly curved facial line may accompany a low degree of mental development.

Other traits of the face, such as the following, can be recorded: Forehead; high, low, vertical, sloping, broad, narrow. Contours of mouth, nose, chin, lips, ears, can be analyzed and described in a similar manner. Teeth should be observed particularly. They may be large, small, regular, irregular, vertical, projecting.

In the Bertillon system the eyes are minutely described, for the eye is so variable and so complex that an accurate description of it is sufficiently characteristic of an individual to be a means of almost certain identification. Eyes are classified according to the presence or absence of yellow coloring matter in them, as pigmented and unpigmented eyes. The ground color of the eye, the color that is always present at birth, is blue; over this, covering it wholly or in part, a pigmented layer develops in some eyes. Both classes contain many varieties. Pigmented eyes may be yellow, orange, chestnut, brown, or maroon. Other traits of the eyes should be noticed; whether large or small; protruding, sunken; bright or dull, and so on.

In a similar manner, by noticing all possible variable traits, the whole body can be analyzed and described. The figure can be described as tall or short for the age; stout, slender; fleshy, thin; bones may be large or small; the muscular development good, poor; neck, long or short, thick or slender; shoulders, broad or narrow, square, sloping, flat or projecting; arms, long or short; hands, large, small, wide, narrow, long or short. The contour of the lines of the palm can be observed in detail and the main lines sketched with a view to finding relations between these traits and mental constitution. The chest can be described as broad, narrow, thin, deep, full, flat; legs, long, short, etc.

These suggestions are intended only to show how to proceed in studying the conformation of the body. Many other important characteristics could be mentioned, and analysis could be carried much further. The judgments that are called for are relative; they become trustworthy in proportion as large numbers of individuals are studied comparatively. Detailed study of the body cannot fail to give to an observer a sense of the great complexity of personality, and its great variability.

Where variability is great, abnormal variation is to be expected, and the human body is no exception to this law. Departures from the typical, marked enough to have received special names, are very numerous and there are all

degrees of variation from norm or average. Pronounced defects may be present in those who are apparently normal in all practical characteristics; in other cases even slight defects seem to be connected with mental deviation. Criminologists of some schools make much of a certain class of marks called stigmata of degeneration. These are often found in normal people, and alone cannot be regarded as evidence of abnormal personality. Yet there are physical defects that mean much to the mind of the expert. In every case peculiarity of body is at least an indication that a close study of the mental life of the person is needed. Some of the most commonly found defects are mentioned below:

The head may be too large or too small, or asymmetrical; there may be large projections or depressions in its surface, or it may be peculiarly shaped as a whole—too narrow, too wide, projecting at the top, or conical in shape. The forehead may be very narrow or sloping, asymmetrical, or too prominent. The ears may be unlike or asymmetrical, very large or very small, projecting, irregularly implanted, irregular in shape, excessively folded, or crumpled. Some part may be absent or undeveloped; the outer rim may be imperfect, too large or too small, deficient in development or grooved. The face may be undeveloped as a whole or in some of its parts, or asymmetrical, having one

side larger than the other or different in outline. The features may be very coarse and heavy or disproportionate one to another. The facial angle may be too small; the mouth may be too large or too small, or may have one angle lower than the other. The lips may be thick, chin small and undeveloped, gums very large, projecting or asymmetrical, narrow, V-shaped, or flat and square.

The palate or roof of the mouth may be too high, too shallow, V-shaped, saddle-shaped, irregular; it may have a longitudinal ridge at the top. Abnormalities of the teeth are very common, and in the eyes of the expert in degeneracy they are important. There may be too many or too few teeth, the presence of supernumerary cone-shaped teeth being regarded as one of the special marks of degeneracy. Some of the teeth may have more than the normal number of cusps; the teeth may be very large or too small, or the surfaces may be notched or uneven.

Defects of other parts of the body are common. Some of them seem certainly connected with mental defects; others are the result of diseases like tuberculosis, rickets, or paralysis. The body as a whole may be much too large or too small for the age, or it may be undeveloped and retain infantile traits. The bones of the chest may project forward, making pigeon-breast, or the chest as a whole may be too

round, like that of an infant. The shoulders may be too square, or too sloping, irregular, asymmetrical, or projecting at the back. The back curves may be abnormal, such defects as hollow back, lateral curvature of the spine, angular deformity, being common. Hands, arms, legs may also have deformities of many kinds.

Even superficial observation of any large group of children will disclose many departures from the normal, typical, or average. In order to have clear understanding of the deformities that have been mentioned, it will be best to observe them in children that have them in marked degree. Among the feeble-minded they will be found more frequently, and usually in a more marked form, than among the normal, but, on the other hand, many children with pronounced mental defects seem to be entirely free from bodily marks. Some departure from type will be found in almost every one, and too much should not be made of slight abnormalities and peculiarities; but the child with decidedly an atypical body should be singled out for more careful study than can usually be given him by the amateur observer.

Other suggestions for observation of physical characteristics can be found in the literature of phrenology and the like, all valuable if studied in conjunction with other and broader conceptions of physical individuality. Especially the

charts and observation systems of phrenologists and physiognomists will be found helpful. The literature of palmistry is also interesting, and contains many suggestive facts. Types of hands certainly exist, and the palmist's classification of fingers into square, spatulate, and conical seems to indicate important traits. The mounts of the hand, and the lines of the palm are also worth study. That there are racial differences in the lines of the palms is well known, and types of conformation of fingers appear to accompany types of temperament, and, in the opinion of some, types of tendency to disease.

In observing and recording the body characteristics of children, it is best to arrange in advance an outline containing the names of traits that are to be observed and the adjectives that are used in describing the degrees or kinds that are usually found. The descriptive terms can then be underlined as the traits are observed, and notes added about such traits as cannot be thus systematically described.

But analysis and description of parts does not exhaust the methods of judging such characteristics as traits of the body. There is also a balance among parts that is characteristic of the person as a whole, and of many variables into larger traits, that for one reason or another have come to be æsthetically regarded. We commonly speak of a child as having a good

head, or good eyes, or face, or figure. Such judgments, even on the part of the untrained observer, have value; for our æsthetic approval and disapproval of physical traits, like our moral judgments of mental traits, are closely related to their biological value. A child should be studied, therefore, with reference to those attitudes toward his physical traits that we commonly call the æsthetic.

REFERENCES

The literature of physical abnormality is very voluminous. Methods for description of normal traits are not yet well worked out. The literature of phrenology, physiognomy, and palmistry should at least be looked into in connection with these topics. Books on ethnology and anthropology should be consulted for methods of describing racial characteristics. Brinton's Races and Peoples, works of Broca, Topinard, and Galton can be mentioned. Books of Bertillon, Warner, Talbot, contain methods of observation and description of physical abnormalities. See especially A. Bertillon, Signaletic Instructions and the Theory and Practice of Anthropometrical Identification.

IV

MEASUREMENT OF THE BODY

Measurement of the body is an interesting and, in part, practical method of studying individuals. Methods that are now in use

have been devised for various purposes, and the measurements that are taken vary with the purpose for which they are made. Anthropometrists measure for the purpose of prescribing exercise and régime. Criminologists and those who study the insane and the defective measure to detect departures from the normal. Physicians measure to discover disease. Penologists measure for the purposes of identification. Biologists, who are interested in the problems of variation, measure to secure data for determining laws of evolution. A long laboratory course in measurement of the human body could readily be prepared which would be full of interest, and in a measure immediately practical for the individuals that were so studied. Performance of a few of the most common measurements and study of individuals with reference to the standards for these measurements will be a good introduction to work in the exact study of individuals.

Height is usually measured by means of a specially constructed rod and the record is best made in centimeters and millimeters. In the absence of the proper form of apparatus, correct measurement of height can be taken by a scale attached to a wall at the proper height. The child should stand with the back to the wall, with feet close together. He should then make himself as tall as possible without raising his heels from the floor. The head will not

rest against the wall, and the weight of the body will be felt on the balls of the feet. In taking the measurement, a square such as is used in drawing can be used. One arm of it should be held against the scale and the square lowered until the other arm rests firmly upon the highest point of the head. Shoes should be removed or the height of the heel measured separately and deducted from the total height.

Weight can be tested with any accurately adjusted scale, the child being in indoor clothing. About five pounds are to be allowed for the weight of clothing in estimating the actual weight.

The two records, height and weight, and the relation between them show important characteristics of the child, and if the measurements are taken two or three times each year, still more important information is obtained. Children of school age should show increase in both these measurements each year, and if they do not, further investigation is desirable. Below is given a table of height and weight computed for American children in several cities. From it the relation of weight to height for each year can easily be computed. The method of comparing an individual to the average is but a rough way of using data about him, but it will yield conclusions that are reliable enough to be of practical use in many cases.

TABLE SHOWING THE AVERAGE HEIGHT AND WEIGHT OF AMERICAN CHILDREN (FROM BURK). WEIGHT GIVEN IS PRESUMABLY WEIGHT IN INDOOR CLOTHING.

Age	wt. boys	wt. girls	ht. boys	ht. girls
5 1-2			41.7	41.3
6 1-2	45.2	43.4	43.9	43.3
7 1-2	49.5	47.7	46.0	45.7
8 1-2	54.5	52.5	48.8	47.7
9 1-2	59.6	57.4	50.0	49.7
10 1-2	65.4	62.9	51.9	51.7
11 1-2	70.7	69.5	53.6	53.8
12 1-2	76.9	78.7	55.4	56.1
13 1-2	84.8	88.7	57.5	58.5
14 1-2	95.2	98.3	60.0	60.4
15 1-2	107.4	106.7	62.9	61.6
16 1-2	121.0	112.3	64.9	62.2
17 1-2		115.4	66.5	62.7
18 1-2		114.9	67.4	

Sitting height. In taking this measurement, the height is taken with the child seated upon a stool or bench of convenient height. The height of the stool is deducted from the total. The relation of sitting to standing height is regarded as an important index of vitality; ordinarily, great length of trunk in proportion to height accompanies good power of vital organs.

Span of outstretched arms can be measured by having the child stand facing a wall, and taking the distance from a point touched by the middle finger of one hand to a point that can just be reached by the middle finger of the other hand.

For most of the following measurements some kind of calipers are necessary. Special instruments can be purchased for making various measurements. The best calipers for head measurements are made from steel, with arms about a foot in length, jointed in the middle. They can be used also for chest measurements, but wooden calipers are better for that purpose. For practice purposes, calipers that will be quite satisfactory can be made by any good mechanic at a small cost.

Chest measurements. Those that are usually taken are the antero-posterior and the lateral diameters, and the circumference. The former diameter is to be taken in a direction perpendicular to the spinal column and at a level with the armpits. The lateral diameter and the circumference are taken at the same height. The expansion of the chest is the difference between two measurements of circumference, one taken at full inspiration, and the other at full expiration.

Head measurements. Many measurements of the head are made, and in exact work the outline of the head in several directions is taken. For the purposes of the school, three measurements can be made to advantage; the circumference, the breadth, and the length. The circumference is taken with the tapeline passed around the head, a little above the eyebrows, and at the back passing over a point

where there is a slight projection of the occipital bone. With a little practice this measurement can be made uniformly; the accuracy of the observer can be tested by repeating the measurements several times. Roughly speaking, the measure of the circumference is a measure of the size of the head.

The length or maximal antero-posterior diameter of the head can be taken by means of the steel calipers. One point should rest on the ridge between the eyebrows and the other point should be moved about at the back of the head until the greatest diameter is found. After some practice this measurement can be taken with a very small error.

The maximal lateral diameter of the head or the breadth is found by moving the calipers about the widest part of the head. The experimenter should stand behind the child, holding the calipers in a horizontal position, and moving both points together in the same plane in a zigzag manner, from front to back, until the widest point is found.

The relation of the two diameters of the head to each other is a characteristic that is regarded as important by anthropologists. It is called the cephalic index, and is a trait that changes but little in the individual after early infancy. The relation is usually expressed by a fraction obtained by dividing width by length. Heads are classified as dolicocephalic, mesocephalic,

and brachycephalic, according to their breadth in relation to length. Some recent studies indicate that there is some relation between type of head and characteristics of the intelligence.

Girth of wrist is taken with the tapeline at the smallest part of the wrist; this, compared with the girth of the forearm taken at the largest part, will show something about the relation of skeletal to soft tissues of the body.

Other measurements that are regarded as important by anthropologists are: Length of the upper arm, of the forearm, of the upper and lower parts of the leg, length of hand and foot, various fractional heights, and the girth at various points. To make most of these measurements, knowledge of the anatomical points of the body is required, and opportunity to measure the child with some of his clothing removed.

Measurements of physical traits have been developed to a degree of refinement that would perhaps seem too minute to anyone except a specialist in anthropometry; but it is better to know too much than too little about an individual. Roberts, for example, gives a list of sixty-one measurements. Another comprehensive system is that of Kellogg, and a list of his measurements can be used for reference. If the anatomical terminology is not familiar, any good text-book on anatomy will give the required information. Tests of muscular strength are included. The measurements are:

Height standing, length of sternum, not including the cartilage, abdomen from base of zyphoid cartilage to pubes, sternum to umbilicus, umbilicus to pubes, circumference of neck, of upper chest in repose, and after expiration and inspiration, lower chest in the same three measurements, circumference of waist, hips, thigh, calf, upper arm, forearm, depth of chest, of abdomen, breadth of shoulders, of chest, of waist, of hips, stretch of arms, bi-iliac diameter, test of lung capacity with spirometer.

Tests of strength: Strength of hand flexors, hand extensors, forearm pronators, forearm supinators, arm flexors, arm extensors, latissimus dorsi, deltoids, pectorals, shoulder retractors, foot flexors, foot extensors, leg flexors, leg extensors, thigh flexors, thigh extensors, thigh abductors, thigh adductors, trunk muscles in anterior, posterior, and lateral movements, muscles of the neck in the same measurements, inspiration power at waist and chest, inspiration and expiration tests with pneumotometer.

From these measurements many coefficients are estimated, such as height-weight, strength-weight, respiration-weight, strength-height, respiration-height, coefficient of vital efficiency, coefficient of vital development, arms-legs coefficient, totals for arms, legs, trunk, chest, entire body.

Other systems provide for somewhat different measurements, and there is no exact agree-

ment, either in the number of measurements that should be made, or the points on the skeleton that should be used as marks. Some investigators have special methods or tests, the importance of which they emphasize. Seaver, for example, measures the specific gravity of the body by computing the relation between the weight of the body in air and its weight in water. Some of the methods of measurement that have been devised are interesting, aside from the results that are obtained by their use, for they illustrate the great complexity of the human body, and the number of its variable traits. Such a system as that devised by Rieger for taking head measurements, for example, can be mentioned. First the exact vertex of the head is located, and at this point the center where two threads are tied together is placed and the threads let fall over fixed points of the skull. The circumference of the head is then marked by a rubber band. With these lines fixed, measurements and outlines are taken by means of lead wire, and the lines are reproduced upon a chart, on which the fixed points are indicated. From the chart any measurement of the head that is required can then be computed.

For the purposes of research, many other measurements and tests of the body are made, and there are many kinds of apparatus and instruments in use in the laboratory for this

work. A chapter should, perhaps, be devoted to the exact measurement of physiological processes of the body and the measurement of internal organs, but this is a field largely closed to the amateur experimenter, partly because of the technical knowledge of physiology and anatomy that is required, and in part because complicated apparatus is needed, and the facilities of a laboratory. Something should be said about the many interesting instruments now in use. Many of them are common to the psychological and physiological laboratory, and are also used in medical work, the same measurement being made from several points of view. Some should more properly be mentioned in connection with description of movements rather than of structures of the body. For measuring and describing qualities of the respiratory function, there are spirometer, pneumograph, and pneumotometer; for circulation, plethysmograph, sphygmograph, cardiograph; for movement, the ergograph and dynamometer. For examination of the size and contour of internal organs there are now the methods of the X-ray, and in the medical laboratory will be found instruments for testing reactions to electrical stimulus, and many others.

Such practice work in anthropometry as is suggested here cannot, of course, be made always definitely practical. Yet anyone that is

enough interested to acquire a few of the simplest methods can become sufficiently informed to detect the more pronounced departures from the normal, and at least to direct individuals to the expert for further examination and treatment. Some knowledge of methods of measuring and observing the human body should be possessed by all who control children, so that they can work with the experts in physical culture and medicine, who are becoming more and more valuable coadjutors in the work of education.

In the detail of methods the main purpose of testing and measuring the body should not be lost from sight. It is not knowledge about the part that is measured that is usually sought, but by means of examining those parts of the body that are most accessible to observation, it is hoped that a knowledge of the vital mental and physical functions with which they are related may be gained. To what extent the superficial traits are so connected, and how, is for the most part unknown, but the study of the accessible trait prepares the way for study of the, at present, inaccessible trait. We wish to know with regard to an individual the functional capacity and vitality of the organism as a whole, and the relative strength and resistance of the physiological systems or groups of organs that comprise the body, and whose combined

functioning make the efficiency of the man as a whole; but at present we are a long way from the ideal of a complete biometry.

REFERENCES

The most comprehensive and most practical guide for the study of anthropometry is the Manual of Physical Measurements, by W. W. Hastings. It includes descriptions of apparatus, directions for performing measurements, and tables containing norms for both boys and girls of all school ages, and for all the important measurements. Other manuals somewhat similar in scope are those of Seaver, Gulick, and Roberts. The Reports of the Department of Research, Chicago Public School contain valuable information about physical measurements of children. For statistics of growth in height and weight the most complete report is that by F. Burk: Growth of Children in Height and Weight, American Journal of Psychology, April, 1898.

Biometrika contains many articles on the subject of variation in physical traits and the relations among them. These articles are somewhat technical, but they will show what is being done in the field of exact measurement.

K. Pearson: On the Relation of Intelligence to Size and Shape of the Head, and to Other Physical and Mental Characters. Biometrika, Vol. 5, 1906, pp. 105–146.

Boas and Wissler: Statistics of Growth. Report of the United States Commissioner of Education, 1896–7.

G. M. West: Observations of the Relation of Physical Development to Intellectual Ability Made on the

School Children of Toronto, Canada. Science, N. S. IV, 1895, 106–159.

F. Boas: Anthropological Investigations in Schools. Pedagogical Seminary, Vol. II, pp. 225–228.

V

OBSERVATION OF MOVEMENT

Information about individuals that is of both practical and theoretical importance can be obtained by observing their habitual motions. The best opportunity for observing the child as a moving body is during his free play. It can soon be determined whether he is essentially an active or an inactive child. The character of the movements should be noticed. The movements of the sound, active child are free, graceful, and animal-like in quality. If they are awkward, difficult, or restrained, other signs of deficient activity should be looked for. Skill should be noticed, as in playing games such as baseball, which requires display of both activity and accurate coördination; or marbles that requires more minute coördination. Information should be obtained from the child about his motor interests; in games, occupations, and school work.

A simple test that is recommended by Warner can be used to obtain information about the child's neuro-muscular constitution. It is

made thus: When an opportunity occurs under natural conditions, extend your hand to the child and take his hand, with some such remark as "Good morning," or "How do you do this morning?" Notice the characteristics of the handclasp of the child. Is it firm or limp? Is it steady or spasmodic? Is there squirming of the whole body, or do the movements seem under control? Is posture good? Are the movements of the face normal, in excess, or is there deficiency of reaction? Does the child look steadily at you, or is the glance shifting or downcast? Is there rapid change of color of the face? Other points for observation will occur to the experimenter; record should be made of all that is observed.

Another simple method of studying characteristic movement habits of the child is called the hand-balance test. It was also first described by Warner. The child is requested to stand with hands at the sides, and then to hold them out in front of him with palms down. The posture that is assumed is then studied. Posture being the result of movements, the character of the muscular control is indicated by it. If the balance is good, the arms will be held at the same height, wrists and fingers will be horizontal, the fingers held closely together, the thumbs close to the fingers and nearly on a level with them. The typical defective position of the child with bad neuro-muscular con-

trol is that in which the arms are held at unequal height, the back bent and hollowed, arms drooping forward, hands bent, thumbs and fingers drooping. This posture is sometimes the result of acute fatigue, but it is also characteristic of the badly organized neuro-muscular system, and its presence in a child in a marked degree always means the need of investigation of the cause. A little practice in performing the test with large groups of children will enable one to use the method with practical results. Another defective posture is the nervous balance, less commonly seen, in which the palms are bent backward, the fingers curved, and sometimes spread apart. This posture is often seen in those subject to over-excitability or tension, especially in nervous girls.

Much can be learned about a child by observing his movements as he is busy at his ordinary mental occupations. Movements of the face should first be observed, when the child is active, as in recitation. Compared with other children, are the facial movements many or few? Is there over-mobility, or lack of expression? Are movements of the eyes steady, nervous, shifting? The upper and lower parts of the face should be observed separately.

Then one should pass to observation of the movements of the body. Are the movements many or few, excessive or deficient? Are there any habitual movements of hands or feet? Are

there frequent nervous or jerky movements? Is the posture erect or drooping? What is the habitual position of the feet in standing?

Observations should also be made when the child is busy, seated at his ordinary mental work. Movements of forehead, mouth, and eyes should be noticed particularly. Habitual movements of any part of the body, the characteristics of the movements, amount of restlessness, habits of attention and distraction should be observed. Complete rules for observing movements in this way cannot be given. They should be made a few at a time, and the child under special observation should be compared with others. In this way the eye is trained to detect differences that are usually overlooked; and certain types are recognized which will serve as standards for comparison.

A few abnormalities of movement can be mentioned, with special reference to the defects of school children. There may be excessive mobility shown in almost incessant action of the body, appearing especially in facial movements, such as blinking, scowling, movements of mouth and tongue. There may be habitual movements of some group of muscles, such as twitching, or rhythmical performance of the same movement. Movements may be unequal in the two sides of face or body. In some cases a decided deficiency of movement will be observed, appearing in lack of expression of the face and

drooping postures. Two types of apparently excessive movement may be observed which, though appearing alike on superficial notice, are very different in meaning. In the first case an excess of movement is due to multiplicity of occupational interests; the child is constantly in motion, but the movements are, for the most part, controlled and purposive. In a quite different type of over-mobility the movements are automatic, unintentional, or, it may be, take place in opposition to effort to control them. Apparently there are two kinds of still child. There is first the motor deficiency that is the result of lack of nervous energy; the child is still because little is taking place in the mind that leads to action. There is also a stillness that results from exceptional control and concentration of effort.

Postures should be observed also as indications of neuro-muscular control: habitual eccentric or atypical postures should always be observed and recorded. In standing there may be unequal position of shoulders, protruding of abdomen, and hollowness of back. The position of feet may be unequal, one much in advance of the other; or the feet may be very wide apart, as though coördination were imperfect, and standing difficult. Sitting postures should also be observed, and the child's habitual postures described; whether erect or drooping, or in any way exceptional.

The manual work of the child should be studied with reference to the qualities of his voluntary movements. It can be described in such terms as the following: Accurate, skillful, quick, neat, quiet, careful, inaccurate, awkward, slow, untidy, noisy, careless.

Gait may be described as: Light, heavy, rapid, slow, awkward, graceful, regular, irregular. Defects commonly seen are jerkiness and irregularity of steps, swaying or bobbing of body, lack of coördination, indirection.

The voice being a motor function in part, participates in the qualities of the movements of an individual. It can be described as: Strong, weak, clear, indistinct or muffled, smooth, jerky, high-pitched, low-pitched, rapid, slow. Defects as stammering, lisping, tongue-tie, defective articulation, should be noticed.

Expression of the face is also, in part, due to muscular qualities, and can be regarded as posture resulting from motor activity in the muscles of the face. Expressions can be analyzed and described in terms of movement or position, and they can also be described by such terms as: Frightened, anxious, suffering, timid, relaxed, tense, determined, confident, sullen, cross, weak, strong, haughty, bold, pleasant, light, serious, frank, deceitful, keen, stupid — and many others.

Observation of characteristics of movement, as the above suggestions should show, is a far-

reaching method of studying individuality. Mind is expressed in movement, and the continuous play of movement that goes on in the body discloses the nature of the mental processes that incite or control the movements, and also indicates the condition of the body itself. No part of individual-study will yield better returns to the practical student than the study of movement, and although the precision of exact experiment is lacking, many clues to important traits of the individual will be found in the characteristics of movement.

REFERENCES

F. Warner: The Children, and other books by the same writer. Dr. Warner appears to have developed this method of individual-study further than anyone else.

F. Burk: From Fundamental to Accessory in the Development of the Nervous System and of Movement. Pedagogical Seminary, Vol. VI, 1895, 5–64. Contains a discussion of the development of movement in the individual as related to its development in the race.

Holt and also Sachs may be consulted for accounts of abnormal movements in the child, and of diseases that produce certain defects of motor activity.

E. H. Lindley: A Preliminary Study of Some of the Motor Phenomena of Mental Effort. American Journal of Psychology, Vol. VII, July, 1895, 491–517.

VI

THE EXPERIMENTAL STUDY OF MOVEMENT

Experimental study of movement can be made in many ways; for movement, considered psychologically and physiologically, is complex, and several variable qualities can be isolated for study. Movements vary in (1) rapidity; (2) strength; (3) accuracy of control; (4) range; (5) endurance. These qualities are themselves also complex and various aspects of them can be considered separately. Endurance, for example, is a result of several factors, and though it can be measured as a separate trait, its factors can also be distinguished, and, in part, calculated. Besides the traits that have been mentioned, the capacity of an individual for learning a movement, or for improvement can be measured.

Strength of movement is usually tested by means of some form of dynamometer. Various muscle-groups can be tested, but for a single test of muscular strength, the strength of the handclasp is usually selected. It appears to be correlated with strength of other movements, and it can be used as a rough measure of the power of the individual to exert muscular force, a characteristic which we now know is by no means entirely due to quality of the muscle, but is a complex result of several factors, in part

psychical. Although a makeshift for a dynamometer can easily be constructed from a spring balance of sufficient force, if accurate results are demanded, one must be purchased. For use with children, an instrument with adjustable handles is best.

It should be understood at once that all tests in which a maximal effort is required, examine, not a single trait, but a complex result of several factors, the numerical result standing for the whole product. Ability to make an effort, and willingness to do so, enter into such a simple operation as making the strongest possible handclasp in unknown proportions. There are many ways of eliminating in part some of the variables that we wish to disregard in the measurement. If the greatest possible handclasp is required, the factor of willingness to exert effort must be made uniform in some way, and this is not easily accomplished. In the case of some children a mere suggestion is sufficient to bring out the greatest effort; others need the stimulus of competition or reward. Much depends upon the experimenter's ability to perceive all the factors that are involved, and to adapt the method of procedure to the conditions. Usually in such an experiment as taking the strength of handclasp, best results are obtained by exciting competition, and by offering a reward for the best record. But with these precautions it can easily be seen that conditions are not made

entirely uniform, psychologically considered; indeed, it must be kept in mind constantly that even the most simple test upon a human being is no mere setting of a task and reading of the result, but a problem that must be studied broadly. In taking the handclasp, then, the experimenter aims at securing the child's greatest effort. Several trials are to be made, and the best single record is to be taken as a measure of strength. Below is given a table showing in kilograms the strength of handclasp of children measured in the Chicago public schools. The figures show the arithmetical mean, a quantity slightly different from the average.

TABLE SHOWING STRENGTH OF HAND CLASP

FROM REPORT OF THE RESEARCH DEPARTMENT CHICAGO PUBLIC SCHOOLS.

age	b.r.	b.l.	g.r.	g.l.
4	6.0	6.0	6.0	5.25
5	9.0	8.0	7.5	7.0
6	10.5	10.0	9.5	9.0
7	12.0	11.5	11.0	10.0
8	13.5	13.0	12.0	11.0
9	16.0	15.0	13.0	12.5
10	17.0	16.0	15.0	14.0
11	19.0	18.0	17.0	15.5
12	22.0	20.0	19.0	17.5
13	25.0	23.0	22.0	21.0
14	28.0	26.0	25.0	23.0
15	35.0	32.0	28.0	25.0
16	41.0	38.0	29.0	27.0
17	45.5	43.0	30.0	27.5
18	49.5	46.5	31.0	29.0
19–20	51.0	48.0	32.0	30.0

In making such a test as the above, the numerical result is not all that is obtained. When a child is taken out of his ordinary routine and set at a novel task it is an excellent opportunity for discovering some of his most distinguishing characteristics. Records should be made of his attitude toward the experiment; what he said and did, the interest and the effort that he exhibited.

Rapidity of movement can be examined in several ways without the use of complicated apparatus. The best movement upon which to experiment is tapping at maximal rate with the finger. It is a natural movement and one that can fairly easily be brought under uniform experimental conditions. The number of dots that can be made with a pencil in 30 seconds can be used as a rough measure of rapidity. Conditions must be made uniform as to general position of the body, manner of holding the pencil, and the like, but the tapping should be done with a free movement, the child being told to tap as rapidly as possible. For more accurate tests of tapping, apparatus such as that described by Bryan (American Journal of Psychology, Vol. 5, p. 139) can easily be constructed. Standards for school ages for tapping with a free movement do not seem to have been established, but comparison of individuals with a large group will give information about exceptional cases that will be interesting.

Tests made upon 200 children in New York City show an average of approximately .180 second as the time of making a dot, when 10-second periods are used. Children ranged in age from eight to sixteen years. Averages for boys were: ten years, .181 sec.; eleven, .176 sec.; twelve, .169 sec. Averages for girls: ten years, .193 sec.; eleven, .182 sec.; twelve, .181 sec.

For estimating rapidity of movement these methods are probably better than the single reaction method which requires the use of complicated measuring apparatus. None of these methods however are very analytic, for they test several qualities of the individual; properly they should be discussed also psychologically, and an attempt made to discover exactly what the factors in the process tested are.

A characteristic of the individual that has as yet received but little attention is the relation of habitual or preferred action, mental or physical, to the greatest capacity. The habit of the individual can be tested for such a trait as rapidity of performing a simple movement such as tapping. The relation between optimum and maximum rate can be tested in several ways. The method of tapping can be used; preliminary experiments being made in which care is taken not to suggest speed or competition, or tests can be made after the speed tests in which the children are directed to tap at the rate that seems easiest, most pleasant, or most

natural to them. Writing can also be used as test method, the quantity of writing that is done in a leisurely task being compared with the quantity that can be done at greatest speed. Copying from a book, using material that is new, or writing passages that are well memorized can be tested in a similar manner. Stern used for the tests of optimum rate, the rate of beating a triple rhythm.

The rapidity with which a more complicated movement can be performed can be tested by having the child deal an ordinary pack of playing cards into four piles. Some preliminary practice should be allowed before a record is taken.

Control of movement is a loose term for several qualities, such as steadiness, accuracy, resistance to stimulus, and the like. Accuracy of a movement can be tested fairly well by having the child strike with a pencil at crosses made upon a large sheet of paper. Twelve crosses can be made in irregular position on the paper, and the child must strike at the center of each. Conditions should be made uniform, and some preliminary practice should be allowed. Fixed rules must be followed with regard to the placing of the paper, manner of holding the pencil, height to which it is raised, and in other details that will readily be suggested to the experimenter. If experiments are made on several occasions, and several records are taken, a study

of the numerical results will be likely to show some types of control of movement. The average error for the day and for the whole series should be computed, and also the average deviation of the trials from the average, the latter in order to find the variability of control.

Another test of accuracy of movement can be made by means of the game in which a ball or beanbag is tossed at a hole in a board. The game becomes an experiment if fixed conditions are prescribed, such as an exact distance, a fixed method of holding the ball, uniformity of surroundings. Series of about twenty-five trials each should be taken.

A refinement of the test just described was used by Bagley. The apparatus consists of a target at which marbles are tossed, the records being made on a carbon paper placed between the target and the recording sheet. This apparatus can easily be arranged by an amateur experimenter, and it can be used for several tests, especially for studying improvement in control of movement, or the method of learning a new movement.

Tests of steadiness can be made simply without apparatus. A simple experiment is performed by having the child hold out at arm's length a long pointer, and directing him to hold it as steadily as possible. Degree of unsteadiness can be estimated by the eye by observing the motion of the end of the pointer; or, if a

more accurate means is required, a rule can be attached perpendicularly to a convenient surface such as the edge of a door and the amount of unsteadiness measured by having the pointer held close to the scale but not touching it. Both the extent of the excursions of the pointer, and the characteristics of the unsteadiness such as rhythm, rapidity, and the like should be observed. Movements of the face and body should also be noticed. The Warner hand-balance test can be used in studying steadiness of control. Movements of fingers, wrists, arms, and the whole body should be noticed.

Other experiments upon steadiness of movement or control can be made by means of an automatograph, which consists in its simplest form of two slates, one of which is made to move over the other by placing marbles between them. A recording device is arranged by attaching an arm to the upper slate and to the arm a vertical tube through which a pencil is passed, slightly weighted, so as to press firmly upon a smoked paper as the slate is moved. Steadiness is tested by having the child place his hand upon the slate, and try to hold it as still as possible. The tracing on the paper is the record of the unsteadiness. Several types will be seen, according to whether there is much or little movement, great or little variability in control, rapid or slow movement. Other more accurate tests of steadiness require

some equipment in the way of electrical apparatus. Bagley used a scroll cut from tin foil with a path 1 mm. in width. An electrical attachment indicated the number of times the edge of the path was struck in trying to follow the path with a writing point.

Control of a reflex movement can be examined roughly without apparatus or more accurately by means of a simple device that can easily be arranged. The reflex wink is a convenient reflex upon which to experiment. The power to control it is very variable among children. Some measure of the control can be made by making quick movements toward the eyes of the child with a pencil. The child should be seated comfortably and told to fixate a point about ten feet from the eyes. The movements are to be made at intervals of about two seconds until the reflex is under control. The measure of ability to control is the number of movements. Apparatus for this experiment that can easily be constructed, or from which simpler models can be planned, is described in the American Journal of Psychology, Vol. XI, p. 244.

Fatigue of movement has been studied by many methods, but somewhat unsatisfactorily for the most part, on account of the difficulty of isolating muscles for experiment. The simplest method of testing fatigue of a movement is to be found in the tapping experiment. Test

of rapidity of movement may be made a test of fatigue sufficient to bring out some individual differences by continuing the movement until there is marked decline in the rapidity. By measuring the amount done during different periods of the work characteristics of susceptibility of the individual to fatigue are made out. Class experiments can be made, if proper conditions are maintained. Large sheets of paper should be prepared by ruling them into quarters; three sheets for each child to be tested, the quarters numbered plainly from 1 to 12. Periods of ten seconds each of maximal tapping are then called for, the time of beginning and ending being accurately indicated. Five seconds can be allowed between the end of one period and the beginning of the next. The number of dots made during each period is then counted. Several trials on successive days will be necessary to establish reliable records, but some exceptional cases are likely to be brought out by a single experiment.

Endurance of a large group of muscles can be tested by having the child hold out the arm at a level with the shoulders as long as he can, holding a light weight. Or the handclasp experiment can be made a test of fatigue, by taking records at short intervals until there is marked reduction in the pressure.

For accurate study of fatigue apparatus is required, and considerable experience in con-

ducting experiments. Apparatus can now be obtained from the instrument makers that will enable one to test the fatigue habit of the individual with accuracy; the only objection being, for ordinary use, its cost. But the characteristic is important, and it has played so important a part in the study of individual differences that it should be studied even in a preliminary investigation.

Individual differences in power to improve in motor ability, and to learn new movements can be tested by several of the methods that have already been described. For testing improvement the experiment must usually be performed on successive days for a considerable period. The rate of improvement is computed by taking the average improvement of each day over the preceding. The variability of improvement should be computed also, as well as the total amount of improvement. And the records should be studied to detect individual differences that are not reducible to numerical terms.

REFERENCES

W. L. Bryan: On the Development of Motor Ability. American Journal of Psychology, Nov., 1892, pp. 125–214.

J. A. Hancock: A Preliminary Study of Motor Ability in Children. Pedagogical Seminary, Vol. 2, October, 1894.

Reports of the Research Department of the Chicago Public Schools. These should be consulted for studies of fatigue.

W. W. Hastings: Manual of Physical Measurements. See for methods of testing strength.

W. C. Bagley: On the Correlation of Mental and Motor Ability in School Children. American Journal of Psychology, 1901, Vol. 12, 193–205.

J. A. Hancock: Observation of Children. Pedagogical Seminary, Vol. 8, pp. 291–340.

VII

GENERAL DESCRIPTION OF MENTAL TRAITS

Having examined the physical nature of the child in some of its fundamental traits the attention can now be turned to the study of the mental life. Anyone who has thoughtfully studied the physical constitution of an individual must have discovered that the distinction between physical and mental cannot in practice be drawn so closely as such a division of subject matter might seem to indicate. The body cannot be understood without regarding it as an expression of mental processes: so mental traits can be understood only by considering them with reference to those physical traits with which they are correlated.

The study of mental individuality has difficulties peculiar to the nature of the mind; for the processes and states that are to be studied

are not only complex and very variable from individual to individual but they are concealed from direct observation and so must be studied indirectly. They must be known by the individual's own account of them, and they must be inferred from their expression in activity. Especially in studying the mind of the child, its expression in the ordinary activities of life or in experimental situations that greatly resemble these normal activities, must for the most part be depended upon rather than the child's own account of his mental processes.

A good introduction to the study of mental individuality is a study of the words that are used in common speech to describe mental traits. In all languages there are many terms with fine shades of distinction for those objects or attributes of objects in which man takes a strong practical interest. It would be expected that for the moral and mental attributes of our fellow beings, characteristics which our daily life is constantly busy in interpreting, there would be a rich vocabulary; and such is the case.

So the study of mental differences can begin with the study of the dictionary. All words that are used in describing human nature should be culled out. They may then be studied with reference to their exact meaning, etymologically, and to their common usage. Especially those terms that seem synonymous

or nearly so should be scrutinized in order to detect shades of difference in meaning. The list that remains after actual synonyms are eliminated can then be classified. Each word should be written on a separate card, its full meaning written out, and in addition some concrete experiences or observations that illustrate the student's own understanding of the word or application of it should be entered. The words are then to be arranged, all words that signify emotional characteristics for example brought together, and then subdivision made according to the emotional states to which they apply; such as fear, anger, love, moral qualities etc. Words describing differences in sensory qualities and in intelligence should similarly be arranged. If this work is well done the student will find himself in possession of a psychological outline for the study of individuals that is based upon the practical experiences of the race, and yet one that will be likely to agree fairly well with the divisions of scientific psychology.

When the words have been studied in the way that is suggested they can be used as guides for the study of individuals. The person under consideration should be observed with reference to each of the words in the list, and notes made about those characteristics which, in the judgment of the observer, the individual possesses, the observation upon which the

judgment is made, or the inference is based being precisely recorded.

Below is given a list of terms that were compiled by a class in psychology. It is not nearly complete, synonyms have not been eliminated, and it is imperfect in other ways, but it will indicate the richness of the English language in terms describing mental differences. Following the list of terms is a brief classified outline that was used for a preliminary study of the traits of school children. More complete descriptive schemes should be worked out by the student.

PARTIAL LIST OF TERMS IN ENGLISH WHICH DESCRIBE MENTAL TRAITS

Abandoned, abject, abnormal, abrupt, absorbed, accomplished, accommodating, accurate, active, acute, acrimonious, adventurous, affable, affected, affectionate, æsthetic, agile, agitated, aggressive, agreeable, airy, alert, altruistic, ambitious, angular, angelic, animated, anxious, appreciative, apprehensive, apathetic, apologetic, ardent, argumentative, artful, artificial, artless, aristocratic, ascetic, aspiring, assertive, assuming, assiduous, attentive, attractive, audacious, avaricious, awkward,

Babyish, bashful, bad, balky, blatant, bluffing, boastful, boisterous, bold, boldfaced, bombastic, boobyish, bothersome, bright, brainy, brilliant, bragging, brave, broad, brokenhearted, buffoonish, buoyant, busy,

Candid, capable, capricious, careful, careless, cares-

sing, careworn, calm, casuistic, cautious, certain, cheerful, chickenhearted, chaste, cheap, cheeky, childish, civil, clean, clear, clownish, clumsy, cold, collected, commanding, common, coarse, comfortable, companionable, comical, complaining, compliant, composed, conceited, confessing, confidential, confused, congenial, conscientious, constant, constrained, consistent, contemptuous, contented, contradicting, contrary, cool, courteous, covetous, cowardly, crafty, cranky, creative, credulous, crestfallen, cross, crotchety, crude, cruel, cunning, curious, cute, cynical,

Dainty, dashing, dauntless, deceitful, decided, decorous, deep, deferential, defiant, dejected, deliberate, despotic, derisive, destructive, determined, dexterous, diffident, diffusive, dignified, diligent, diplomatic, direct, disagreeing, discourteous, discreet, discriminating, disdainful, dishonest, dishonorable, disobedient, disorderly, disputing, disrespectful, dissatisfied, distant, distracted, distressed, docile, dogmatic, domestic, domineering, doublefaced, doubting, dowdy, downhearted, dreaming, dressy, droll, dull, dumpy, dutiful,

Earnest, eccentric, effeminate, effusive, egotistic, eloquent, embarrassed, emotional, emphatic, emulative, enigmatical, energetic, entertaining, envious, equable, erratic, erudite, even, evil, exact, excitable, exemplary, extravagant,

Facetious, fair, faithful, faithless, familiar, fanciful, fastidious, faultless, fawning, fearful, fearless, fickle, filthy, flighty, fluent, foolhardy, forcible, forgiving, forward, fractious, frank, frivolous, friendly, funny, fussy,

Gallant, gawky, gay, genial, genteel, genuine, gloomy, gluttonous, good, goodhumored, goodnatured, goodtempered, goody, gossiping, graceful, grasping,

grateful, grave, greedy, grouty, growling, grumbling, gushing,

Happy, hardhearted, hairbrained, harmless, hasty, hateful, haughty, headstrong, hearty, heartbroken, heedless, helpful, hesitating, highminded, highstrung, highwrought, hilarious, hinting, honest, honorable, hopeful, hopeless, humble, humiliated, hurried, humorous, hypoeritical, hysterical,

Iconoclastic, idealizing, idle, ignorant, illbred, illnatured, illogical, imaginative, imitative, immature, immethodical, immodest, immoral, immovable, impassive, impatient, imperious, impertinent, impetuous, impolite, important, impressible, imprudent, impudent, impulsive, impractical, impressionable, impure, inactive, inane, inattentive, incautious, incoherent, inconsistent, inconspicuous, incorrigible, indecent, indefinite, independent, indifferent, individual, indisereet, indolent, indomitable, industrious, inert, inexpressive, infantile, informed, influential, ingenious, ingenuous, initiating, innocent, inoffensive, inquisitive, insensible, insincere, insinuating, insipid, insistent, intellectual, intelligent, intense, interested, interesting, interrupting, intolerant, intractable, introspective, intrusive, inventive, investigating, invincible, irascible, irrational, irresolute, irreverent, irritable,

Jealous, jeering, jerky, jesting, jolly, joyful, joyless, judicious, just,

Keen, kind, knowing,

Laconic, ladylike, languid, lawless, lazy, levelheaded, leisurely, lewd, liberal, licentious, lifeless, light, lightheaded, lighthearted, likeable, listless, literary, lively longheaded, loquacious, loud, lovable, lowspirited, loyal, ludicrous,

Magnetic, malevolent, malicious, malign, manly, ma-

tronly, mature, mean, merciless, merry, methodical, mincing, misbehaving, mischievous, miserable, miserly, modest, moody, moping, morbid, morose, motherly, motionless, mournful, motor, mouthy, muddled, mulish, musing, musical, mysterious,

Naughty, natural, neglectful, nervous, nerveless, noiseless, noisy, noncommittal, nonsensical, normal, notional,

Obdurate, obedient, obliging, obscene, obstinate, observing, obstreperous, odd, offhanded, officious, offish, old, oldfashioned, oldmaidish, openhearted, opinionated, opposing, optimistic, orderly, ordinary, original, ostentatious, outspoken, overbearing, overwrought, overlearned,

Painstaking, palavering, particular, passionate, passive, peculiar, penurious, perfect, perplexed, persevering, persistent, persuasive, pessimistic, perverse, petulant, petty, pigheaded, pious, plausible, pleasant, playful, plucky, pliable, poetic, poised, polite, politic, pompous, popular, possessed, positive, practical, praiseworthy, precautious, precipitate, precise, precocious, prejudiced, prepossessing, presumptious, pretending, pretentious, prevaricating, prim, priggish, problematic, procrastinating, profuse, progressive, prolix, promising, prompt, proper, prosaic, protesting, provoking, proud, prudent, prudish, punctilious, punctual, pure,

Quarrelsome, querulous, queer, questioning, quick, quickwitted, quiet, quizzical,

Rash, rational, reasonable, reckless, rebellious, recondite, refined, reflective, refractory, regular, regretful, religious, reproachful, resentful, reserved, resolute, resourceful, respectful, responsive, restful, restless, restrained, reticent, revengeful, roguish, romantic, rough, rowdyish, rugged, rude,

Sad, sagacious, sanctimonius, sanguine, sardonic, saucy, saving, scatterbrained, scheming, scholarly, scrupulous, sedate, secretive, sedentary, selfconceited, selfconscious, selfcontrolled, selfish, selfpossessed, self-reproachful, selfrighteous, selfsatisfied, selfsufficient, selfwilled, senseless, sensible, sensitive, sententious, sentimental, serene, serious, servile, sexual, shallow, shamefaced, sharp, sharpwitted, shiftless, shifty, shilly-shallying, shoddy, showy, shrewd, shrinking, shy, sideling, silent, silly, simple, simulating, sincere, slangy, sluggish, slovenly, slick, slippery, slothful, smart, smirking, smiling, snappish, snarling, sneaky, sneering, snickering, snuffling, sober, soberminded, sociable, social, soft, softhearted, solemn, solitary, sophisticated, sordid, sorrowful, soulless, sour, spasmodic, spirited, spiritless, spiritual, spiteful, spontaneous, sportive, spoiled, sponging, sprightly, staunch, stagey, steady, stealthy, stiff, still, stingy, stirring, stolid, stormy, straightforward, strange, strenuous, stubborn, studious, stupid, sturdy, submissive, subservient, subtle, suffering, suggestible, sullen, superficial, surly, superior, suspicious, sulky, sullen, swaggering, swearing, sweet, sympathetic, systematic,

Taciturn, tactful, talebearing, talented, talkative, tantalizing, tardy, tasteful, tasteless, tattling, teachable, teasing, tedious, tempestuous, tenacious, tender, tenderhearted, testy, thankful, thankless, thickskulled, thievish, thinking, thoughtful, thoughtless, thrifty, tidy, timeserving, tired, tireless, torpid, touchy, tough, tractable, tranquil, treacherous, tremulous, tricky, trim, trifling, troublesome, trustful, trusty, truthful, tumultuous, tyrannical,

Unaccountable, unaffected, unassuming, unbalanced, unbelieving, unbending, uncharitable, unchaste, un-

civil, unclean, uncomfortable, unconcerned, unconscious, undaunted, underhanded, uneasy, uneven, unfaithful, unfair, unfeeling, unforgiving, unfriendly, ungainly, ungovernable, ungrateful, ungraceful, unhappy, uninterested, unkind, unkempt, unpleasant, unprincipled, unreasonable, unreliable, unscrupulous, unselfish, unsettled, unsociable, unthinking, untruthful, unwholesome, unwilling, unworthy, upright, uproarious, urbane, useful,

Vacant, vain, valiant, variable, vehement, versatile, vicious, vigorous, vindictive, violent, virtuous, vivacious, voluptuous, voracious, vulgar,

Waggish, wanton, warmhearted, wary, wasteful, waspish, weak, wellbred, wellmeaning, wellspoken, whimsical, whimpering, whining, wicked, wild, willful, willing, winsome, wistful, wise, witty, wideawake, wishywashy, worthless, wretched, witless, witty, woebegone, worrying, worthy,

Zealous.

OUTLINE FOR STUDY OF AN INDIVIDUAL

This blank calls for a description of a child largely in terms of adjectives. Underline all terms describing qualities that the child under observation DISTINCTLY possesses. Underline twice if you think the quality is present in a striking or unusual degree.

Name of child.....Sex.....Grade.....Age.....
Nationality.....

Attendance: regular, irregular? Home conditions: good, poor? Health: good, poor? Muscular strength: good, poor? Is the child tall or short (for his age), stout or slender, fleshy or thin, good looking or plain looking, well formed or poorly formed?

CHARACTER.— Is the child good-natured, agreeable, well-disposed, contented, too good-natured, over-social, ill-natured, ill-

disposed, disagreeable, sensitive, revengeful, jealous, complaining? Generous, obliging, selfish, disobliging? Affectionate, sympathetic, lacking in affection, cruel, a tease, a bully, over-affectionate? Obedient, disobedient, balky, willful, "tough," over-docile? Honest, frank, truthful, trustworthy, self-respecting, dishonest, sly, untruthful, without self-respect, mischievous, over-conscientious? Modest, confident, conceited, bold, proud, bragging, timid, bashful, babyish, self-depreciating? Earnest, ambitious, serious, cheerful, frivolous, "funny," over-talkative, a giggler, sad, over-anxious? Energetic, calm, self-controlled, quiet, nervous, excitable, emotional, lacking in self-control, restless, lifeless, lacking energy? Refined, coarse, neat, untidy, over-fastidious, polite, impolite?

Mental Work.— Is the child industrious, lazy, patient, impatient, persistent, easily discouraged, attentive, inattentive, intense, listless? Quick, accurate, thoughtful, careful, slow, inaccurate, thoughtless, careless? Original, a memorizer, retentive, forgetful?

Manual Work (e. g. drawing) — Is the child accurate, skillful, quick, neat, quiet, careful, inaccurate, awkward, slow, untidy, noisy, careless? Are the child's larger movements (as in walking) quick, graceful, slow, awkward?

Class Standing.— Arithmetic: good, poor? Language: good, poor? Geography: good, poor? Nature Study: good, poor? History: good, poor? Reading: good, poor? Music: good, poor? Drawing: good, poor?

Play.— Is the child rough, active, quiet, retiring, lifeless?

Describe in detail (on the back of the blank) any marked peculiarity of the child; any unusual ability or disability, mental or physical. Specify any bad habit. Remark upon anything else of interest in regard to the child.

.....Teacher.

Date.....

VIII

THE EMOTIONAL LIFE

The study of the emotional life is probably the most important chapter in the study of individuality, for not only are the emotions the foundation of all the practical life, but they enter into the abstract intellectual functions in various ways. Failure to understand the emotional life of those whom they teach is probably the cause of more bad pedagogy on the part of teachers than any other cause, for although the emotions are so fundamental a part of the life they are the very part, the full meaning of which it is least easy to communicate, and which is most often purposely hidden from the observer.

To understand the emotional life of a child, observation of conduct as a series of connected acts is required. Many characteristics, interests, habits, and deficiencies that may seem perplexing when considered in themselves become plain when the dominating emotions are understood. Especially such primary emotions as fear, anger, self-love, sexual-emotion, sorrow, anxiety, need careful scrutiny — as well as the more complex or higher emotions such as those that are shown in the social, religious, moral, and æsthetic life. As to methods of studying emotion in the child, and the extent to which

the child should be made a participant in the investigation of his own emotional life, there will probably be differences of opinion. The importance of the subject, however, and the great need of more light upon the emotional nature of the child demand that serious attention be given the subject, especially those phases of it that concern the teacher. The conduct of the child should be observed in order to detect the prevailing moods and emotions. Information that can be obtained in the schoolroom should be supplemented by accounts obtained from the home, and in some cases, from companions of the child. To what extent the child should be made to report about his own emotions will depend upon the relations between investigator and child and the means he may have of turning the information he may gain to the service of the child. But it should be understood by all teachers that the school does not as a rule deal with the child in his most individual aspects, and that the very least one can do for the nine-tenths of the child that we do not teach is to understand it.

Fear. Fear, and its derivatives, anxiety and worry, should be carefully studied, for they may be the dominating moods in the life of the child. It should be known whether a child is naturally confident and fearless or timid; whether there are particular fears or aversions

that influence conduct. Information should be obtained from the home about fears in infancy and early childhood; whether the child has ever evinced exceptional or morbid fears; whether he has ever suffered from the effects of fright or shock of any kind. Has there been great fear of the dark or of imaginary animals? Are there any causes of worry or anxiety? In exceptional cases insight into the child's fears will be the most important information that can be obtained about him, and in all cases an investigation of this part of the emotional life is essential.

Further information about fear can be obtained by questioning a child about his attitude toward objects that are commonly feared. Written exercises on the subject are allowable. A list of common objects of fear can be written and children asked to write about those they think one would be most afraid of and to tell why. The direct question as to what the child is himself most afraid of, and why, can be used, and he may be asked to tell in detail about some time when he was badly frightened. To detect subtle strains of fear and worry that lurk in the mind is not always easy, and the method cannot be reduced to rule. It should be kept in mind, however, that in any case of unsatisfactory conduct in a constitutionally timid child, even in conduct not apparently directly

connected with the emotion of fear, fears and aversions due to them may be the underlying causes.

Anger. Anger in one or another of its forms may also be a dominating emotion throughout life. As irritability, jealousy, resentment, tendency to chronic fault-finding it may permeate all the conduct. The characteristics of the child's anger reactions should be studied. Is anger easily aroused, intense or feeble, quick to subside or long continued? What causes are most likely to excite it? What are its characteristic expressions? The child should be studied with regard to such descriptive terms as: Good-natured, agreeable, well-disposed, contented, too good-natured, ill-natured, ill-disposed, disagreeable, irritable, sensitive, revengeful, jealous, complaining, quick-tempered, sullen, cruel.

Information about the qualities of the child's anger reactions can be obtained through his written opinions about situations in which teasing, injustice, accidental injury, perverseness of inanimate things, are involved. A list of common causes of anger can be written and the child requested to write about those he thinks would make one most angry and to tell why. Such themes as the following can be discussed —" When someone purposely breaks your new sled; " " When you are in a great hurry and find that your brother has hidden

your hat;" "When your best friend tells tales about you that are not true;" and the like. Questions about the child's experiences with anger and its derivatives, his opinions about their effect on his conduct, his effort to overcome them, can be asked about under proper conditions.

The child's habitual emotional tone, with regard to elation or depression, should be investigated. There are normal variations within wide limits, and pathological departures in both directions. It should be ascertained whether the child is habitually cheerful, or sad, whether he is easily depressed, feels keenly slights, losses, and reproofs. Is the child easily moved to laughter, light-hearted, sunshiny, lacking in seriousness? Is he changeable or moody? In general is the child calm, apathetic, self-controlled, excitable, lacking in self-control?

When the basic feelings such as have been suggested have been investigated the more complex attitudes and interests which they underlie can be studied. Broadly speaking, the emotional life can be divided for study into moral, religious, social, and æsthetic emotions. These are not to be regarded, however, as entirely separate compartments of the mental life, but as the accompaniments of reactions of the organism in situations that overrun these philosophic boundaries in many ways. There is as yet no complete psychological analysis of the emotions,

and therefore no completely systematic and scientific way of examining the emotional traits of individuals.

The moral life. In noticing the moral traits of a child some of the characteristics that have been observed before must again be considered, but with special endeavor to see the effect of these characteristics upon conduct regarded as a social relation. The common descriptive terms that relate to moral conduct should be brought together and the child studied with reference to them. Such terms as the following should be considered:

Agreeable, well-disposed, contented, too good-natured, over-social, ill-natured, ill-disposed, disagreeable, irritable, sensitive, revengeful, jealous, complaining, malicious, generous, selfish, obliging, disobliging, affectionate, obedient, yielding, obstinate, disobedient, balky, sympathetic, lacking in affection, cruel, teasing, bullying, over-affectionate, secretive, untruthful, willful, tough, over-docile, dishonest, sly, hypocritical, deceiving, without self-respect, mischievous, over-conscientious, modest, haughty, indifferent, blasé, inquisitive, serious, cheerful, lazy, frivolous, orderly, refined, coarse, neat, disorderly, untidy, over-fastidious, polite, impolite, innocent, pure-minded, obscene, vulgar.

Such a description of morality, it is obvious, is not based upon a strictly philosophical conception of morality; many of the qualities that are thus described can be regarded also as æsthetic, or morally indifferent, from the sub-

jective standpoint, but they describe conduct with reference to its agreeableness to the observer. Many other terms could be included.

Many test questions and problems have been used in studying the moral life of children; some of them suited well to the study of certain individual differences. In general, however, a child's written opinion about moral questions shows degree of intellectual development rather than moral qualities of feeling and habit. Some of the questions that have been used are given below. The results that have been obtained by writers who have used them can to a certain extent be used for comparison in studying the moral development of children. Assigned as a series of compositions they will be likely to give considerable insight into the moral development of children, and will bring to light some peculiar and exceptional cases. In order to obtain good reactions from children by this method considerable interest must be roused in a general way in advance without suggesting answers to questions. Otherwise answers are likely to be brief and superficial.

" Mary, six years old, had a box of paints for her birthday. The next day, when her mother was down town, Mary painted some of the best parlor chairs. When her mother came home, Mary ran to her and said, ' O, mother, come and see how pretty I have made the chairs look.'

The chairs were spoiled. If you had been Mary's mother what would you have done? Why? ''

'' Mary's parents told her not to sit on the floor. One day the teacher told her to sit on the floor in one of the kindergarten games. Whom ought Mary to have obeyed, and why? ''

'' Hattie Smith's papa was very rich and bought her many beautiful things. When Hattie was nine years old she went to live with her Aunt Mary who was very kind to poor people. One day when Hattie was at school her aunt gave her old hood to a poor girl. When Hattie came home her aunt told her what she had done, and Hattie said, ' Why did you give it away? It is my hood. My papa bought it for me.' Her aunt told her that her papa had sent her a nice new one. But the next day at school Hattie sat next to the poor girl who wore her hood — Finish the story and make it end as it should.''

'' Tell about some punishment you have received that you think was unjust. Why was it unjust? Tell about a punishment you have received that you think was just. Why was it just? ''

'' James' father gave him a dog; but James often forgot to feed it, and the dog cried at the door. Then James' father took the dog and gave it to a kind little girl who lived down the street. Who had the best right to the dog; the father, James, or the little girl? Why? ''

" One day the teacher left the room, and while she was gone several children in the room began to make a noise. The teacher heard the noise as she was coming back, but she did not know what children were out of order. As none of the class would tell, she kept the whole class after school. Was the punishment just or unjust? Why? "

" Harry stole a dollar from his mother's purse. Some of it he spent for marbles, and with the rest he bought a knife. The next day he felt bad about it and told his mother what he had done. If you had been his mother what would you have done? "

" Ella stole a dollar. Mary asked her where she got it. Ella said she would tell if she would promise to keep it a secret. Mary promised; so Ella told her that she took it out of her mother's purse. Ought Mary to have told Ella's mother? Why? Or why not? "

" Name three worst things to do. Why are they bad? Name three best things to do. Why are they good? "

Religious emotions and interests. In the young child the religious ideas reflect for the most part the environment of the child with but little change. Individual differences are the result of differences in teaching. If however the deeper roots of natural religion are investigated, it will be found that there are differences in capacity for emotional attitudes

toward the unseen world, and in the imaginative expression of these feelings. In studying the religious feeling of a young child one must study some of his secular interests at the same time; such as his interest in Santa Claus, the characters of heroic tales, fairies, and the mythological persons that represent the abstract and the general. The method of the school composition has been used to test the religious life of a child but it usually examines intellectual qualities rather than qualities of feeling. However, where there is imaginative interest there is emotional attitude and something can be learned from the child's description of God, and his ideas of the soul and the future life, if the questions are put in such a way as to make him think rather than repeat what he has heard.

Two traits of the religion life that have deep roots in fundamental emotions should be considered with reference to individual differences. The first is the belief in the spirituality of things, which is a strong characteristic of childhood but differs greatly among individuals. The second is the temperamental tendency toward or away from optimism about the good will of things in general toward the individual. In connection with the first topic the child's life of imagination, his belief in fairies, unseen worlds, spirits, mental traits in inanimate objects, must be studied. With regard to the second topic the child's sense of himself as an

individual must be studied. Already the investigation of fear and other fundamental emotions and moods will have thrown some light upon the conditions underlying differences in the capacity for faith. Individuals differ in their sense of isolation as an individual; their feeling of the presence of spiritual companionship; in the sense of security as an individual in the midst of larger forces. Such differences determine differences in capacity for religious sentiment, feeling of dependence, and faith. This is an obscure region in the personality of the child, and such suggestions as these about the psychology of the religious life are about all that can be given in the way of directions for a preliminary study of the religion life of the child.

Æsthetic feelings and interests. In studying the æsthetic life of the young child a somewhat broader conception of æsthetic feeling than is commonly adopted for the purposes of philosophic studies of the beautiful must be used. The lovable, the beautiful, and the useful are confused in the child's mind, and therefore examination for differences in the æsthetic sensibilities must include the study of a wide range of the child's interests, in which the idea of attractiveness is dominant. Neatness and fastidiousness with regard to dress should be noticed as a sign of a sense for the æsthetic. The child's interests in flowers, scenery, ani-

mals, should be recorded. Musical interests and appreciation of musical values, interests in color, habits of order, appreciation of symmetry and form, must be taken into account. Response to rhythm, preferences among rhythmical forms and tempos, are also indications of the æsthetic sense of the child.

Æsthetic feeling can be put to test in several ways. The simplest experiments are made upon color preferences. Small squares of various colors, in paper, can be used as test material. The series should contain various tints, shades, and tones. For a detailed account of the method of making these experiments one may consult Seashore's "Elementary Experiments in Psychology," Chapter XV. Appreciation of form may be tested by asking for the child's preferences among geometrical forms and irregular figures carefully drawn upon cardboard. More complex stimuli can be used, such as a series of pictures, including portraits, landscapes, and color schemes. The composition method can be used to advantage: the child can be asked to write his preferences for colors, pictures, music, poetry, and to state the reasons for his preferences. Such questions as "What is the best song you know?" "What is the prettiest color for a dress?" can be asked.

The child should be studied with reference to all those descriptive terms that apply to the

æsthetic life in any way: such as neat, fastidious, orderly, exact, musical, artistic, and the like.

Social feelings and interests. These terms cover a wide range of activities of the child, some of which have already been investigated; for in a sense all conduct of the individual is social in its implications. More particularly it is desired to know about the child's attitudes toward people. In general is it one of confidence, or fear and shyness? Especially in the presence of strangers is the child bold, reserved, timid? Does he associate freely with other children, or is he in any way anti-social or solitary? Is he liked by his companions? Is he inclined toward over-sociability, or too great dependence upon companionship for his interests and happiness? Is he envious or jealous of his fellows? Is his competitive spirit keen or weak? What is his attitude when he is beaten in games or surpassed in school work?

The method of school composition can be used in ascertaining the child's attitude toward social games, his preferences among these games, his ideas about chums and the like. All descriptive terms that apply to such social traits and activities as have been mentioned should be carefully examined, and the traits of the children under observation studied with reference to them.

Many other aspects and details of the emotional life could be made the subject of observation and experiment, and a much greater degree of psychological analysis could be brought to bear upon the problem; but such lines of investigation as have been suggested will show the various methods of observing the emotional life, and will also indicate the complexity and the difficulty of the problem. Emotional qualities of the individual must be studied with reference to physical condition, to heredity, and to environment. Especially in cases in which there are marked moral defects or great eccentricity in the fundamental emotions the need of far-reaching examination of the physical life of the child must be recognized: for it is in the interest both of the child and of society that these conditions be understood as early in the child's life as possible. Many children, obviously defective, pass through the schools attracting little serious attention to their condition if they happen to have normal capacity for doing the work of the school — and it should be remembered that most of our insane and criminals have passed through the public schools, and also that their defects have had their origin largely in aberrations of the emotional life, and the physical conditions that are correlated with them.

REFERENCES

Many books and articles could be given as references in connection with the subject of study of the emotions. If one wishes to read the general psychology of the subject, Ribot's Psychology of the Emotions is probably still the best introduction. James' Principles of Psychology can be consulted. Articles by G. S. Hall in the American Journal of Psychology should be read, especially A Study of Fears, 1897, pp. 147–249, and A Study of Anger, 1899, pp. 516–590. For references to many articles on topics connected with this chapter the Bibliographies of Child Study by L. N. Wilson should be consulted. Barnes' Studies in Education contains most of the articles from which the composition methods of studying moral ideas are taken. A few scattered references can be given to articles that will show how this method has been applied.

E. H. Darrah: Children's Attitude Toward Law. Studies in Education, 213–216.

E. Barnes: Punishment as Seen by Children. Pedagogical Seminary, III, 235–245.

E. Barnes: Theological Life of a California Child. Pedagogical Seminary, II, 442–448.

F. B. Gates: Musical Interests of Children. Journal of Pedagogy, 1898, 265–284.

W. S. Monroe: Development of the Social Consciousness of Children. Proceedings of the N. E. A., 1898, 921–928.

IX

INTERESTS AND INSTINCTS

In adult society individuals obviously differ greatly in their interests. In part this seems to be the result of environment or circumstance. But there appear to be also inherited or innate differences in adaptability of the organism to particular tasks or habits. These deep-seated tendencies act selectively upon the environment, and the environment reacts in a way to confirm and modify the original differences.

The free activity of the child must be studied in order to detect those fundamental traits of interest that will later determine his practical conduct. The routine work of the school, which tends to conventionalize and make children similar to each other, conceals rather than discloses the traits that it is desirable to observe.

The greatest of the interests of childhood is play, and in a sense it includes all others. One must avoid the error of thinking that the play interests often give definite indications of permanent life-interests or abilities. It is the more general characteristic of play that is to be observed; the actual interests of the child often change with the season or the neighborhood. An account of the child's play interests obtained from the home will sometimes be illuminating. In general are his play interests

merely active or are they constructive? Is the free activity of the child relatively great or small? Are there strong play tendencies toward the æsthetic, the informational, or experimental? Is there interest in animals, in nature, in indoor life? Marked interests of any kind that are different from the ordinary should be closely observed and recorded. Imaginative fertility in games should be noticed, and capacity for leadership. Written accounts by children of their preferences for games may throw light upon their individual differences. The child should be asked to name the best outdoor games, the best indoor games, and to give reasons for each choice.

Interest in sex is one of the most important topics in considering the instincts of the child, though less so in younger children than in the case of those approaching adolescence. Attitudes toward those of the opposite sex should be observed and especially precocity or unusual shyness or aversion should be noticed. Sentimentality, especially on the part of boys, should be studied with reference to other traits of character. The whole subject of the development of sexual feeling, though so important for the understanding of an individual, belongs rather to the expert than to the preliminary examination. It should be understood, however, that the subject is of central importance, that no study of an individual is complete with-

out full knowledge of the subject, that eccentricities and aberrations in the sexual sphere are causes of much unsatisfactory conduct on the part of children that usually remains unexplained, or is attributed to the wrong cause.

Property interest. This is a fundamental interest in the race, and its early manifestations in the child should be observed. What is the child's reaction when his possessions are lost or taken? Does he show a strong sense of values? Is he generous or selfish with his possessions? Is he careless of them, or does he tend toward the opposite habit? Are there any indications of the hoarding and hiding habits of the miser? Is the child interested in earning and in saving money?

Interest in collecting. Although interest in making collections is almost universal among children, and the kind of object that is collected at any time is largely determined by imitation, attitudes of children toward collecting vary much, and in his collecting interests the child evinces characteristics that will be likely to be permanent. Cases of unusually enthusiastic collecting should be noticed and also cases of apathy in the midst of a collecting epidemic. Natural propensities toward system and order, and perception of classification, can be seen in the child's disposition of his collections. A written exercise on the subject of collections can be assigned. The children should be asked

to name all the collections they have ever made; which they have found the most interesting, and why; what has been done with them, why they were begun, and how far developed.

Migration interests. Another interest that is manifested early in life, and which has a bearing upon permanent characteristics of the individual is the interest in wandering; related, it is believed, to the migratory instincts of the race. Is the child a stay-at-home child, or does he like to wander to new scenes? Does he take interest in a wide or narrow environment? Is he fond of exploration, discovery, excitement and danger? Does he show any morbid tendencies toward fear of the new or unknown? Something can be discovered about the child's migratory instincts by his reactions to such questions as: Where would you like best to spend a vacation? Where would you like best to travel? Why? How long would you like to live at home? When you leave home where would you like to go to live? — and other similar questions.

Ambitions. The child's actual ambitions at an early stage may be but a reflection of environment, or expression of a stage of development, and yet they are, to a certain extent, prognostic in some of their characteristics. Ambitions that are expressed in strong play habits, especially interests in mechanical occupations, literary pursuits, and artistic work are probably indica-

tive of permanent interest and natural adaptation in many cases. Compositions on the subject of adult occupations may give valuable information about a child's ambitions. Such questions as these can be asked: What do you wish to do when you are grown up? Why? Of all the people you have read about whom would you like most to be or to imitate? Why?

Interests in school subjects indicate, in a measure, special abilities and types of mind. The child should be asked to write about his preferences for school subjects, and to give reasons for them. The interest expressed is to be studied in relation to the ability the child shows in the preferred subjects. The child with a marked interest in mathematical work should be studied with reference to indications of special interest, ability, or deficiency in other lines; especially in such subjects as history, nature study, music and drawing; and in memory work generally. Correlations among interests may be discovered that are based upon deep-seated psychological laws.

Interests in literature. These interests are partly diagnostic of temperament and partly indications of stage of development. Excessive interest in books should be noticed as a sign of lack of motor interests; in rare cases it certainly indicates exceptional ability in literary or scientific pursuits. Interests different from those of children of the same age should be studied in

cases in which they appear; such as early interests in fiction, and interests on the part of older children that show infantile traits. Children may be asked to write about their interests in books, to tell what book of all they have ever read they like best, and the reasons for the preference. Names of ten books that they like can be called for; or names of all the books they have read, that they can remember.

Other interests common to childhood should be examined and all indications of special interests and ability should be noticed in connection with other traits of the child. Especially to be sought is information about that which is peculiar to the inner forces of the individual rather than to the effects of the educational process through which he has been put. It is difficult to distinguish between the two factors in interest, and it is still more difficult to distinguish between developmental stage and permanent individual characteristic. The importance of interests in the life of an individual depends, moreover, not entirely upon the strength of the interests considered singly, but in their balance and interaction. Strong interest, and even great special ability, may exist side by side with other interests or tendencies that antagonize them, and perhaps in the end completely nullify them.

It is particularly in studying the interests of the child that the relation of developmental

stage to individual difference can be studied. A child may differ from the average of his own age because in some trait or many he has advanced beyond the stage of that age or has lagged behind it; later these inequalities may be eradicated by the effect of environment or by accelerations or retardations of the growth processes. Or these departures from the average rate of development may be permanent, and the departure may increase with age. The child may become a defective from actual deficiency or lack of balance among his functions — or in rare cases he may become a genius. Not all differences among individuals can thus be interpreted in terms of development of functions, but it can readily be seen that one cannot profoundly understand an individual without understanding the whole process of development of the child.

The complexity of the individual comes clearly to light in observing interests, and their meaning. It can be seen that the purposive life can be conceived of as a sum of interests, and that these interests are balanced in the individual, and so interrelated and checked one by the other, that a normal life, coördinated with the life of other individuals in mutually helpful ways usually results. But the development of interests is no mere unfolding of instincts; for at the very beginning of life an intricate process of interaction commences between these innate

will elements on the one hand, and on the other the environmental forces, themselves highly complex, variable to a great degree, and increasingly so as civilization advances. Interests are the means of selecting environment, and the mind of the child being plastic, interests are produced and modified by the environment. Gradually these interacting forces of temperament and environment come to balance, mental content and habit accumulate about definite interests, and the individual comes to that final differentiation that marks him off in adult life as a person performing a particular function in the intricate mesh of society. We understand an adult fairly well for practical purposes when we know the main content-groups of his mind, and something about the relative force of these groups in determining conduct. In the child these content-groups have not become formed, and the interests are still in a state of flux, revealing only here and there indications of permanent form.

Having now examined the life of the child from the standpoint of observation of his natural interests, the attention can be turned to the effect of environment; to understand what it has contributed to the interests, and what, in fact, the actual content of the child's mind is. From this point of view an interest arises in what the child had actually said, done, made, read; what his experiences have been, where he

had lived, what he has learned in addition to the content furnished him by the school.

If the child's school experience has been in any way exceptional the circumstances should be known. The home conditions should be understood. Are they favorable to the development of many interests? Has the child lived in an atmosphere of interest in the large themes of current affairs? Has he been much influenced directly or indirectly by books? By occupational interests? In general, is he well-informed, and in what topics does he seem to be most, and in what least, informed?

The content of mind can be examined further by definite written or oral test. Such questions as the following can be used to test general information; they can be modified to suit particular conditions of the group to be tested:

From what is cotton obtained? Linen, gas, kerosene oil, beer, brandy? How is cloth made? A nail, a tack, a shoe? What does a lawyer do? A broker, a banker? How does a manufacturer make money? A railroad, a bank? How does an automobile go? A locomotive, a telephone, a telegraph instrument, wireless telegraph, a phonograph, a piano, an organ? What is the cost of coal per ton? Sugar per pound, shoes, a house, a horse? Who is now King of England? Of Germany, Russia? Where is there war now? Who is Vice-President of the United States? The Senators from

the State? Representative from the District? Name five physicians, five lawyers, five business men, and five clergymen in the city. How far is it from here to (name five large cities)? What is the railroad fare to each? Name five people who have written books. Other questions about current events, general and local, can be asked. The answers can be marked and graded in the manner of the ordinary examination paper.

Other questions enquiring about the experience of the child can be asked, such as: Tell all you can about some city you have visited. What others could you tell about? What do you know about an ocean that you have seen for yourself? A river, a lake? Tell all you can about a steamboat, a sailing vessel, a hotel, a theater, a circus. What kind of factories have you visited? Tell all you can about each. What books have you read? What newspapers do you read? Tell about something you have read in a newspaper this week. Tell about some good way for a boy (or girl) to earn money.

REFERENCES

For additional reading in the subject of children's interests, instincts, and experiences, the Bibliography of Child Study by L. N. Wilson should be consulted. Many articles will be found under the headings of ambitions, interests, amusements, play, that will throw sidelights upon these topics of individuality. Most

of the articles bearing most directly upon this chapter will be found in the Pedagogical Seminary, Barnes' Studies in Education, Proceedings of the N. E. A. An article by L. W. Kline, The Migratory Impulse vs. the Love of Home (Am. Jour. of Psychology, Vol. 10, pp. 1–81), can be mentioned especially as an excellent attempt to interpret interests in childhood in relation to an evolutionary conception of their origin. Books on Child Development such as those of Chamberlain, Tanner, Kirkpatrick, should be read.

X

SOME GENERAL CHARACTERISTICS OF INTEREST

In addition to those traits of the life of emotion, instinct, and interest that have been described there are certain others that are related in a special way to the development of intelligence. They can perhaps best be designated as qualities or factors of interest. Included under this topic would be an investigation of qualities of attention, habits of imitation, curiosity, interests in experimentation and in mental activity for its own sake, susceptiblity to suggestion. To investigate all the traits that are brought to view in taking this attitude in observing the individual would require access to the exact methods of the laboratory, and an intimate knowledge of the methods of psychological analysis, for some of the most central themes of psychology are here approached.

But enough can be accomplished in a preliminary study to show the bearing of these qualities of the individual upon his intellectual development, and to indicate differences among individuals and the methods of observing them.

Attention. Facts about the attention of the child under observation should be ascertained; whether his attention is generally easy to gain and hold; whether, when he is working at tasks that do not appeal to his natural interests, he is strongly attentive and persistent, or whether the attention is fluctuating, easily interrupted, and lacking in persistence. Deficiency of attention may be due to lack of effort, or to lack of ability to concentrate, or to both. Comparison of the child's habits of attention and interest when working at tasks that are intrinsically uninteresting with his attitudes in preferred work or play, will throw some light upon the relation of effort to capacity for concentration.

The child's spontaneous interests in acquiring knowledge should be noticed; as expressed in curiosity, habits of enquiry, experimentation, habits of observation. Curiosity can be defined as the desire to know, without special reference to need or use. Does the child under observation possess this quality in a marked degree? Does he show a desire to gain information for a purpose, and is he persistent in his efforts to gain it? Does he seem to have spontaneous interests in learning, or does he merely absorb

what is assigned him to learn? Does he ask questions frequently, and does he take interest in learning by testing or experimenting? Does the child seem to have a keen sense of truth, and to desire to get to the bottom of a question? Is he critical, or is he readily satisfied with the answer that is given him? Does he try to prove statements for himself, to seek authority for his opinions, to demand it of others? Does the child seem to enjoy mental work for its own sake? Does he like to do hard problems, and to get the answer for himself? Or does he readily give up, and ask for help? Does he enjoy solving puzzles, and what kind of puzzles interest him most? Is he patient and persistent in solving them, or is he impatient and irritable? Does he enjoy exercises in which the mind is allowed free play, as in imaginative construction in planning stories, plays and the like? Is he often in a "brown study" or subject to states of absorption or reverie (which must be distinguished from "just looking")? Does he generally seem mentally active when not working at definite tasks? Is the child imitative, as in preferences, dress, manner, in games? Or is he independent in his views, habits and the like? Is he suggestible, and does he readily accept advice?

Many of the characteristics mentioned above are accessible to experimental methods, and some of the most interesting problems of ex-

perimental psychology center in these topics.

Experiments upon attention can be performed upon a class. Sheets of paper containing sixty problems in multiplication should be prepared, two places in the multiplicand and one in the multiplier. The children are directed to multiply as rapidly as possible for two minutes. The point that is then reached is marked. Then an interesting story is read aloud to the children until their attention is well aroused. Then, while the story is continued, two minutes more of the mathematical work, done as before at greatest speed, are required. The amount and quality of the work done with distraction is to be compared with the amount and quality done without it. The numerical result is a measure, in a way, of a quality that appears in much of the child's work, but one that is psychologically complex. Both willingness and ability to concentrate are involved. One child may with less effort turn the attention away from the story because he is less interested in the story, or because the mathematical work appeals more strongly to him. Some are incited to greater effort than others by the element of competition that is involved. A sense of duty and literal obedience influences others. Numerical results, therefore, need analysis and interpretation. By varying the conditions and material of the experiment one or another factor can be emphasized. For a second test,

words can be copied from a book and such distractions as music or loud noise can be used. But the result is always a measure of a complex made up of both ability and willingness to work under certain conditions. The factor of effort can be made more uniform by strongly exciting competition, by giving rewards for the best work and other means, and so an approximately pure power of concentration for a particular form of work may be tested. The most interesting result of class experiments upon attention is likely to be the exceptional record. Experiments that take the child away from the routine ways of applying the mind such as are common in the schoolroom, although they test the same abilities, are likely to reveal aspects of the mental organization that have not before been observed. The results may throw light upon abilities and disabilities of the child that underlie qualities of his school work.

Habits of observation can be tested in several ways. Written exercises can be assigned calling for description from memory of familiar objects. Such questions as these can be used: Tell all you can remember about the appearance of the front entrance of the schoolhouse. Tell all you can about the back of the schoolroom. Which way do the seeds of an apple run? Of a pear? How does a cat come down a tree? How many legs and how many wings

has a fly? Additions to such questions can readily be made, and the results can be graded and marked like the ordinary examination paper.

An interesting experiment that will test the same trait of children can be performed upon a class. Time should be chosen when there is a short intermission in the school work. Someone enters the room by prearrangement, goes to the desk and speaks to the teacher in low tones, meantime performing some apparently unintentional act, such as taking a flower from the desk and smelling it, and then replacing it. He may then start to leave the room, return to the desk, and get a book as though he had forgotten it, and then leave the room. The test action can be simplified or complicated in any way to suit the needs of the experimenter. The children are then asked to describe in writing what happened in the room, to give details of the appearance of the visitor, and to tell precisely what he did. Children should be allowed time for the writing until they are satisfied that they have told all they can remember.

Many experiments upon suggestibility have been devised. One that will show something about the characteristics that are to be studied, but which will not be suitable to bring out degrees of difference sufficient for a study of individuality, can be made as follows: An atomizer is prepared containing pure water. After a few

minutes' talk about flowers or perfumes, in which some familiar odors are mentioned, the children are told that something is to be sprayed about the room, and they are to write afterwards whether they have smelled anything and what it was; whether it was very strong, or just ordinary, or barely strong enough to be noticed. The water is then sprayed in several parts of the room. The questions are repeated and the children are then allowed to write their answers. Among younger children, nearly all will respond to the suggestion in some degree, but some unusual cases are likely to be discovered in which there is a high degree of suggestibility.

Another instructive experiment upon suggestibility which can be performed without apparatus, and which will admit of numerical calculation, is the following: Twelve cards, 80 mm. by 40 mm., are prepared. In the center of the cards lines are to be drawn, one on each card. The lines should be drawn lengthwise of the cards with equal margin at each end. Eight of the lines are to be drawn 60 mm. in length and one each 48, 36, 24, 12 mm. Sheets of paper (ruled) of foolscap size are to be provided. The method of experimenting is as follows: The cards are shown to the child one at a time and in this order — 12, 24, 36, 48, 60, 60, 60, 60, 60, 60, 60, 60. After the first line is shown, and before the next appears, the

child is requested to draw the length of the line (the line still remaining before him) upon the top line of the ruled sheet, beginning at the left margin of the paper. The next line is shown and reproduced in the same manner; and so on until all are drawn. Nearly all children will be influenced by the increasing steps to continue to make them in reproducing the lines of 60 mm. length. Various degrees of suggestibility will be observed. Some will continue to make the lines longer to the end of the series. Others will make a correction when the last line drawn is obviously longer than the new copy, and will commence another increasing series. The amount and character of suggestibility shown can be estimated by inspection of the papers and the children can be graded or grouped according to the degree of suggestibility. Or the amount by which lines after the fifth exceed the length of the fifth line can be used as a rough index of suggestibility.

A similar experiment can be made with cartridge shells loaded with shot. A series of weights can be arranged weighing 20, 40, 60, 100, 100, 100, 100, 100, 100, 100, 100 grams. The weights are to be lifted in succession with the thumb and forefinger of the right hand. When the first weight is lifted the child is told that it weighs 20 grams, and he is asked to estimate the weight of each of the others as it is lifted. The experimenter records the weights that are

announced and the amount of suggestibility is estimated as in the preceding experiment.

REFERENCES

Wilson's Bibliography may be consulted for titles of articles on attention, imitation, suggestion, and the like. For further reading in methods of psychological experimentation Seashore's Elementary Experiments in Psychology can be read, or Sanford's Course in Experimental Psychology. The most complete treatise on the psychological laboratory and its methods is Titchener's Experimental Psychology, in 4 volumes. A few special articles can be mentioned such as:—

E. H. Haskell: Imitation in school children. Pedagogical Seminary, III, 30–47.

C. Frear: Imitation. Pedagogical Seminary, IV, 382–396.

M. H. Small: The Suggestibility of Children. Pedagogical Seminary, IV, 176–220.

J. A. Gilbert: Mental and Physical Development of School Children. Studies from the Yale Psychological Laboratory.

XI

SENSES AND PERCEPTION

In general psychology, the experimental study of the simplest mental processes such as sensation and perception is much further advanced than the study of the more complex processes. In the study of individuals, on the

other hand, attention seems rightly to have been most directed to those larger functions that are most characteristic of individuality. The study of the elementary processes by the exact methods of the laboratory, although an important part of the study of differences among individuals, is a part that as yet bears less directly upon practical problems. It is possible that in a more advanced stage of development of the subject relations between sensory processes that can be measured simply and exactly and the complex processes that cannot thus be estimated may be so well made out that differences in the former may be used as a measure of differences in the latter — and thus make it possible to perform a simple series of experiments that will test the individual. But at present, as we have seen, no such testing of the individual is possible. The extended experimental study of the senses belongs rather to general psychology than to the study of individuals, at least for the purposes of obtaining a practical knowledge of them. Yet it is both interesting and important to discover some of the differences among individuals in the elementary processes that general psychology aims to isolate for study.

Vision. The functions of the eye are complex, and the differential study of vision could be made the subject of a long course of experimentation. Such functions as sensitivity of the

eye to light, acuity of vision, sensations of color, extent of the field of vision, muscular functions of the eye can be measured with precision. The methods used are, for the most part, those used in general psychology and are the same for adult and child. They can be studied at length in the standard works on experimental psychology.

Discriminative sensibility for brightness can be examined by means of a series of grays according to the method described below. For other methods of testing that require some form of color mixer, one can consult Sanford's "Course in Experimental Psychology," p. 128.

Color discrimination. For studying color discrimination, Gilbert used a series of specially prepared shades of red cloth, so dyed that the difference between two successive shades could not be detected by anyone. The test can be performed by means of a series of shades of red in paper, or test material can easily be prepared that will do well for practice purposes. A solution of potassium permanganate can be prepared, making a bright red. Fill a two-ounce vial with the liquid and mark it on the bottom (1). Add two ounces of clear water to the solution and fill another bottle, marking it (2); and so on until there are twenty-five or thirty bottles filled. The colors should appear so graded that no successive ones can be distinguished. The bottles are then arranged in an

irregular order and the child is asked to sort them into groups, putting together those that appear alike to him. The number of groups that are made will be a measure, inversely, of his color discrimination.

More accurate methods of using a color series for testing discrimination can be practiced; the methods are such as are employed in many forms of psychological experiment. One of the medium shades is chosen as a standard. This and the shade next above or below are shown to the child together, and he is requested to say which is the lighter. If he cannot tell, the standard is then to be compared with the next but one in the series, and so on until two are found about which the child gives correct judgments in about three-fourths of the trials. In testing, the two shades to be judged should always be shown together, sometimes the lighter and sometimes the darker on the left. The distance apart in the series of the two shades that the child thus decides to be different is the measure of his discrimination for this particular series of shades.

Such tests, it must be understood, are but in part tests of sensory keenness of the individual. They are, to a certain extent, also tests of attention and general intelligence. Several traits should be observed in making any test of discrimination; the fineness of the judgment as is indicated by the numerical expression de-

scribed above, and the variability of the judgment as indicated by errors or by the results of tests at intervals. The manner in which the child delivers the judgment should be noticed; also, the degree of confidence expressed, and the extent to which he looks to the experimenter for confirmation of his judgments.

Discrimination for visual lengths can be tested by having the child mark the center of strips of paper of equal length. Many trials should be made, the average error found, and also the average deviation as a measure of variability.

Rapidity of perceptive processes can be tested without complicated apparatus. For test material a printed page can be used, or better, specially printed slips, containing lines of capital letters, set in haphazard order. Ten lines, fifty letters in each line, including ten A's, will be found convenient. The lines should be set solid, that is, without spacing between the letters. At a signal the child begins to cross out all the A's as rapidly as possible. Work is continued for two minutes. Both quality and quantity of the work should be taken into account. Several types of children will be found, such as the rapid-accurate, slow-accurate, rapid-inaccurate, slow-inaccurate. The test should be repeated on several occasions and the average taken. Irregularity in the work from day to day is to be noticed as well as the amount

done. The process can be complicated by having the child cross out more than one letter.

This method can be used also as a test of mental fatigue. Cards containing twenty lines should be used and the work continued until all are marked. A signal is given at the end of each thirty seconds, and the point then reached marked. The quantity and quality of the work for each period are then to be estimated.

Rapidity of perceptive processes can be tested in other ways. Cards can be prepared containing geometrical figures cut from black paper, ten on each card in an irregular order. Other series can be prepared consisting of squares of colored paper or capital letters. In testing, the cards are exposed for a period of two seconds, and the child is asked to tell all he saw during the exposure. With some practice with a split second watch the timing can be done sufficiently accurately; or if there is no watch, a pendulum can be made from a piece of twine and a weight adjusted to beat one or two second periods.

A still more complicated process involving choice made as rapidly as possible can be tested. It is a process that is typical of many practical acts, and experiments have shown that it stands in close relation to the general intelligence of the child. An ordinary pack of playing cards can be used. Some preliminary practice may be

necessary in order to make the children familiar with the four kinds of cards. In testing, the child is requested to sort the cards as rapidly as possible into four packs. The pack is held face downward. Better material for making this test is a pack of specially printed cards bearing large capital letters, A's, B's, C's, D's, in equal numbers. The letters should be large and distinct, and glazed cards used.

A series of experiments should be made in connection with the test just described, in which the child deals the cards into four piles without sorting. If this time is subtracted from the time of sorting with choice, the time of the choice processes is roughly measured.

Experiments made with similar tests upon children in New York City show a close correlation between ability in the test and the general intelligence of the child as shown by the relation of his age to grade in school. The sorting time was also found to be closely correlated with ability to deal cards without choice, with rate of tapping, marking out A's, and with memory for digits, the amount of correlation varying in the different tests.

REFERENCES

The works on Experimental Psychology by Titchener, Sanford, Seashore, and Witmer can be consulted for additional experiments. See also Gilbert, article previously mentioned, for methods of testing

color discrimination. Many references will be found in Wilson's Bibliography under headings:—vision, color perception, judgment, discrimination.

XII

SENSES AND PERCEPTION

(Continued)

For testing discriminative sensibility for sounds, apparatus is needed, but the method of experimenting can be illustrated and estimates made sufficiently exact for present purposes by means of a devise that can readily be arranged. A board a few inches square should be provided and covered with thick cloth or felt glued smoothly to the surface. A scale marked in fractions of an inch is attached vertically to the side, and should be two feet in length. For testing, marbles of equal size and weight can be used. Starting from a given height a sound is made by dropping the marble upon the board; this is the standard sound with which a louder sound is to be compared. The standard sound should be made and immediately afterward a sound a little louder, made by dropping a marble from a greater height. If no difference is detected, a greater distance is tried, the standard and the test sound being made in close succession. The distance is to be increased gradually, sometimes the louder sound

being made first and sometimes the standard, until a point is reached at which about three-fourths of the answers are correct. The distance between the height of the standard and the height thus found can be used as a measure of discriminative ability for this particular series of sounds.

Discrimination for pitch of musical tones can be tested satisfactorily only with apparatus and laboratory methods. Gilbert devised a pitch pipe with a movable piston and a scale showing changes to $\frac{1}{32}$ of a tone. For exact tests, tuning forks are usually used. For practice purposes a simple sonometer can be devised by stretching two brass wires across the top of a table an inch from the surface. The wires are attached at one end and weighted at the other. The weights are adjusted so that the two strings when sounded together appear to be in perfect unison as judged by an acute ear. The child is then told to listen to the sounds as they are made in succession, the first being dampened before the second is produced, and to tell which is the higher in pitch. If no difference is detected weight should be added, and another judgment taken, and so on by the gradation method that has already been described, until a point is found at which there is an observable difference. The amount of weight that has been added is used as a measure of the discrimination for this particular experiment.

Other experiments upon sound perception may bring to light interesting differences among children. Perception of rhythm can be tested by having the child tap with the end of a pencil in imitation of rhythms that are similarly tapped by the experimenter. One should begin with the simple musical rhythms and then try more complex combinations. The tapping should be slow and distinct.

Experiments upon other senses can be included or not in this series according to the amount of practice in psychological methods that is desired. The practical results so far as the numerical estimates are concerned will be slight. But children are usually much interested in such experiments and their actions in the tests are likely to be more illuminating to the amateur observer than the numerical records he will make.

Sensitiveness of the skin to pressure is tested by means of very light weights called minimal pressure weights. They can be made from elder pith or cork if accurate scales such as are used in a chemical laboratory are accessible. Rectangular prisms of the pith can be made, 5 mm. square, and the weights cut from these. Handles can be made by fastening a loop of hair to them. A series of from 2 milligrams to 20 milligrams will be found suitable. Considerable skill and patience will be required to make an accurate set. In testing, the lightest

weight is held by the loop on a pencil point or long needle and is then let down gently upon the back of the hand of the child to be tested, the eyes of the child being closed. If nothing is felt the next heavier weight is tried in the same way, always using the same spot on the hand. The testing is continued until pressure is distinctly felt. Several trials will be necessary, and care must be taken that the weight is held steadily, and that the child is not informed in any way by the movements of the experimenter when the weight is about to touch the skin.

Discriminative sensibility to pressure is tested conveniently by cartridge shells loaded with shot. A series should be prepared using 100 grams as a standard, or the experiment can be made with two test weights, the weight of the variable being changed by adding shot. Have the child close his eyes and place the standard weight upon the palm of his hand. Remove the weight and test with a weight heavier by an imperceptible amount, and so continue until a weight is found perceptibly different from the standard weight. Care should be used in testing to vary the order in which standard and test weights are presented.

Discrimination for double pressure on the skin has been tested for various purposes. It has been widely used as a test of fatigue, but is now somewhat discredited for that purpose.

Delicacy of discrimination is also supposed to be correlated with intelligence. For testing for double pressure sense, a special form of apparatus, the æsthesiometer, is used, but in want of that, a carpenter's compass will do fairly well. The object of the experiment is to determine how far apart the compass points must be placed, when brought simultaneously into contact with the skin, if they are to be felt as two points rather than a single point. The points should first be placed close together, and the wrist of the child touched, care being taken that the two points touch the skin exactly simultaneously. The front of the wrist can conveniently be used, and the points are to be placed lengthwise of the arm. If the points are not felt distinctly as two, the distance is to be increased by small amounts until a point is reached at which correct judgments are given in about three-fourths of the trials. The distance at which the points are then apart is carefully measured upon a millimeter scale. The points can then be placed at a distance apart at which they are certainly felt as two, and the child can be tested again, gradually decreasing the distance until there begin to be errors in about the proportion of one to three correct judgments. The two records should nearly coincide, and the average can be taken as a measure of the function that is tested.

The accuracy with which a pressure point on

the skin can be located can be measured thus: — Have the child close the eyes and touch his wrist firmly with the point of a pencil. Ask him to touch the same point with a pencil held in the other hand. Measure with a millimeter scale the errors that are made. Twenty or more trials should be made and the average taken, and also the average deviation from this distance in order to test the variability of the judgment. In testing, if the child is not satisfied with the first point he touches he should be allowed to move the pencil.

With a sharp point trace a line firmly on the wrist of the child moving the point as slowly as possible. Measure the distance the point must be moved before the child can tell in what direction the movement was made. Several trials are to be made, always lengthwise of the arm, but changing the direction frequently, now moving from elbow to wrist, now from wrist to elbow. The palm of the hand and the tip of the forefinger can also be tested.

With the large pressure weights and the same method that was used in testing discrimination for pressure, discriminative sensibility for lifted weights can be tested. The child is to lift now the standard now the test weight using the thumb and forefinger of the right hand.

Temperature sense can be experimented upon roughly as follows: Fill a jar with water that feels neither warm nor cold. Put a ther-

mometer into it and read the temperature. Fill another jar with water of the same temperature. The first jar is to be kept at the standard temperature and the second is to be the variable, being gradually increased in temperature by the addition of water of higher temperature or by heating. The subject is tested thus: He first puts the hand into the standard jar and then into the test jar, proceeding as in other tests of discrimination until a perceptible difference is detected. The results can be checked by proceeding from the clearly perceived difference to the less perceptible.

Pain sensation is usually tested by the algometer, an instrument consisting of a blunt testing point and a scale which registers amount of pressure. The temple algometer is the best. An algometer can easily be constructed by anyone with a little mechanical skill. In testing, the point is applied to the temple and pressure is exerted until the subject declares that the sensation just begins to be painful. If a number of trials are made at different times accuracy can be attained in measuring individual differences. Much attention has been given by criminologists to the study of the pain sense, but there is so much uncertainty in interpreting results that the conclusions from these studies are not likely to be very helpful in studying normal cases. Exceptional cases both of dullness and acuteness of pain sense should be

studied with regard to other indications of exceptional temperament or deficiency.

Taste sensations can be tested simply by means of bitter, sour, salt, and sweet solutions. The best substances from which to make the test material appear to be saccharin for the sweet, phosphoric acid for the sour, sodium chloride for the salt, quinine sulphate for the bitter. The best method when great accuracy is not needed is to put into a burette a quantity of a strong solution of known strength and to drop this gradually into a glass containing a considerable quantity of water. The child is first to taste the water (which should be distilled) taking as much as can be held in a small spoon, and putting it well onto the tongue. Then a little of the solution is to be added, and the water tasted again — and so on until the taste is clearly recognized. The amount of the solution that has been used can be read from the burette. To prevent guessing, the child can be tested with water and the test solution alternately. If his judgments are not correct in nearly all trials he must be tested again with a stronger solution. Tests can be made with each of the four materials, and the amount of each required to stimulate taste recorded. The numerical results are of course valuable only for comparison of individuals tested in the same way under exactly the same conditions.

Another method of testing taste is to prepare

several glasses, each containing the same amount of distilled water, and to add from a solution of known strength to make dilutions of different strengths, graduated from one that cannot be detected by the keenest taste to one that can clearly be recognized by all. Tests can be made as in the previously described experiment.

By using two burettes and two glasses the least differences or differential sensibility for taste can be measured. A standard solution of medium strength should be used, and by the method of gradation the increase in the strength that is required before a difference can be noticed must be found. The mouth should be rinsed with water after each test.

Smell can be tested in several ways but results are not likely to be so clear as in experiments upon taste. The least stimulus that can be sensed and the least difference can be measured by means of the olfactometer, a simple instrument that can be made or purchased.

A more convenient way of testing smell is by means of solutions of graduated strengths. Essence of clove is convenient to use and can be made by adding one part of oil of cloves to fifteen parts of alcohol (Sanford). The essence, mixed in various proportions with water, will make the proper test material. Several bottles should be prepared, containing a graded series of strengths of the solution. The sub-

ject is requested to smell these, removing the stoppers one at a time and passing from the weakest solution until one is reached that can be recognized. Discriminative sensibility for smell can be measured by the gradation method by comparing a variable test solution with a standard.

Though such experiments on the senses as have been described in this chapter and the preceding will not as a rule issue in practical results, so far as numerical records are concerned, exceptional cases of dullness or acuteness of senses may be discovered, and all such cases should be studied carefully with regard to other exceptional traits. Either acuteness or dullness may accompany mental deficiency. Defects that occur in one sensory sphere are usually due to local causes sometimes insignificant in nature, and testing of the senses may lead to their detection and removal.

REFERENCES

Literature on experimental psychology previously cited; and Wilson's Bibliography for references to touch, pressure, hearing, rhythm, smell, taste, temperature sense, and the like.

XIII

MECHANISM OF THE MIND: MEMORY

The senses being the avenues by which experience is accumulated, some insight into intellectual characteristics of individuals should be obtained by studying them, especially in their relation to each other. Other information about the intellectual traits will have been obtained by the study of those impulses toward the development of intelligence that have been called characteristics of interest; but these factors do not constitute all the variables in elementary functions that underlie intelligence; for without certain other functions a "stream of consciousness" could not be built up at all, and experience could not be used in new situations. These essentially mechanical functions of the mind can be studied under two general topics: memory and association. Memory for present purposes can be defined as the power of retaining and reproducing impressions, and association as the power of connecting experiences in consciousness. This is not very satisfactory psychology, but will indicate the traits that are to be studied. Memory, as a matter of fact, is a very complex function or rather several functions are involved, and to a certain extent must be considered separately in studying individual differences. Memory

power varies in the individual with the kind of material that is presented to consciousness; the memory may be good for one kind of material and poor for another, apparently not very different.

In studying memory, observations can first be made of the qualities of the ordinary work of the child in school, for in school the memory functions are constantly brought into use, and can easily be observed. In general is the child's memory good or poor? Is it better in some subjects than in others, or for some kinds of material or work in the same subject? Compared with other aspects of the child's intelligence does the memory appear to be good or poor? Are there marked peculiarities in the memory habits of the child, such as unusual ability in rote memory, power of retention for a long period, unusual rapidity of committing to memory?

Some of the characteristics that can be noticed in the ordinary work of the child can be put to more exact test by simple experiments. A beginning can be made by testing the so-called pure or immediate memory for simple auditory or visual series of stimuli. For testing visual memory a series of cards should be prepared containing digits in irregular order. If large cards are used and care is taken to present them in good light, experiments can be made upon a class. Some of the cards

should contain six, some seven, and up to twelve digits in a line. In testing, a series of preliminary experiments can be made in order to discover the number of digits that can be reproduced nearly but not entirely correctly by the best in the class. A long series can then be made with this number. In testing, the cards are shown to the class one at a time, about as much time being allowed as would be given to a slow reading of the same number. Five-second periods can be used for nine digits, and time can be indicated by a pendulum or a metronome. The card is then covered and the children must write immediately what they have seen, putting the digits in the order in which they appeared on the card. The experiment is of course but an approximate test of pure visual memory; the child may repeat the digits to himself, and thus motor and auditory elements may be brought in. But it presents a situation in which visual stimulation predominates.

To examine the auditory memory a similar method is used. The digits are read slowly and distinctly, special pains being taken not to group the sounds rhythmically. Immediately after the reading, the children must write what they have heard. In this case also the stimulus is not pure; the child may visualize as he listens, and repeat to himself, thus bringing in secondary motor and visual elements.

Care should be taken in performing these experiments to make conditions uniform for all children that are tested, and for each series. Besides accurate timing and uniformity in the manner of presenting the stimulus, attention should be called at a fixed time before the stimulus is to be presented. In computing results the number of digits that are correctly given in the right order is counted. The papers should be inspected also for the purpose of detecting qualities of the work that are not expressed in the numerical result, and for exceptional cases. Ability to memorize, tested in this way, will be likely to show relation to the general intelligence of the child, but possibly not a very close relation, especially among older children. Relatively poor memorizers may be found among bright children, and some dull children will be likely to make good records in the memory tests.

The amount of this relationship can be studied by grading the pupils in a series with regard to record in the memory tests, and also grading them for their school work or averages in examinations in several subjects. The position of each child in the two series can be observed, mathematical methods such as described by Spearman can be applied to the records and the degree of correlation between the two records can be calculated. For this, more than

one series of tests must be made, and if possible two sets of school marks should be used.

Other studies of memory can be made by using words, syllables, and letters for test material. Lists of words can be selected representing various sense departments such as words of color, sound, taste, smell, action. A series of twenty words may be read to the children and after a short interval the words are to be written. The character of the errors and omissions are then to be studied in order to determine the relative excellence of memory for the different kinds of material.

Individuals apparently differ with regard to the aspect of any complicated situation to which they attend, or which they best remember; whether its content as such or its form or relations. Stern thinks this difference one of the most important in determining intellectual types. He tests this habit by experiments in memory and rhythm. Three series of tests are made, one in which melodies without rhythm are presented, another in which rhythm without melody is used, and the third when the two are combined.

Other methods of testing memory that have been used for practical tests in school will be likely to show a closer relation to the abilities used in the ordinary school task than the records for immediate memory, for they involve a test

of the child's power to learn by repetition. A series of fifty digits is prepared, either in duplicate on paper, or written on a blackboard and kept covered until used. When the attention of the children is well aroused, the series of digits is exposed for ten seconds. They are then covered and the children must write all they can remember, placing them in the proper order. The digits are then exposed again under the same conditions, after which the children must again write all they can remember — and so on until the whole list is reproduced. The number of exposures before the list is completed is the measure that is required. Copying from a book can be substituted for reproducing the digits. The child is allowed to copy as he pleases, and the number of the references to the copy he makes is observed. This test is supposed to show a close relation to the mental ability of the child for school tasks in general.

A modification of this experiment can be made as follows: — A series of twenty-five digits is exposed as before, and the child is allowed time to read them twice. He is then to try to reproduce the series. The series is then again exposed as before, and another attempt made to reproduce it. The tests are continued until the child has repeated the whole series accurately. The number of the exposures is recorded, and the papers are studied

with reference to the characteristics of the child's learning habits that they exhibit.

The characteristics of the child's ability to retain impressions can now be investigated. Series of digits may be memorized by the child by being repeated until they can be reproduced without error. Later in the day or on the following day, the children are to write the series. The number that are retained, and the nature of the errors are to be recorded. The retentiveness can also be measured by the number of repetitions that are required to relearn material after it has been partially or entirely forgotten. Other kinds of material can be used, such as paragraphs of reading matter, single words, sentences. Different qualities of retentiveness can be tested by varying the material thus: matter can be used that demands memorizing of separate words, or again, material in which interest of one kind or another assists in the memorizing. Exact numerical estimates of memory for connected matter are somewhat difficult to make, but usually the material can be divided into units in which each unit contains a separate idea or phrase, and the number of these units that are correctly reproduced counted.

A study of the relation between immediate memory and power of retentiveness can be made by the method used by Sharp, which is as follows: Seven disconnected words are read to

the subjects at the rate of two each second. Immediately after the reading the subjects are to write the words. Seven series of seven words each are given in this way. After the last series is written the papers are removed, and the children are then to write from memory all the words of the whole series they can remember and in the order in which they were given.

For examining retentiveness for still longer periods questions can be asked about the school work of the preceding year. The number of titles from last year's reading books that can be recalled will serve as an indication of retentiveness for long periods. This method can be used for determining memory for different kinds of material; such as memory for dates, for verse, for description, for scientific explanation. These methods differ from the ordinary examination of the school not so much in their subject matter as in the point of view taken. The school examination tests for the memory of particular facts, but in the psychological examination the particular material that is used for a test stands for a type of subject matter, and the purpose is to examine the child's general ability with regard to material of this class. Other differences in habit of memory will be brought out in the study of the mechanism of mind as an associative process.

REFERENCES

Bibliography and works on experimental psychology mentioned in previous chapters should be consulted for references to present topics. Chapters in some textbook on general psychology should be read. Texts by James, Royce, Baldwin, Angell, Thorndike, Judd, can be recommended.

XIV

MECHANISM OF THE MIND: ASSOCIATION

Association of ideas like memory is a name for a complicated process, one therefore which is variable in many ways. Just what the fundamental variables of the process are is not yet entirely clear. In studying differences in association among individuals, we wish to examine the manner in which sequences take place in the mind, under the simplest conditions, for differences in the mechanical functions of the mind must be supposed to underlie types of intellectual ability.

For an introductory experiment upon association a test can be made upon a class of children. Lists of common words can be prepared, 25 in each list. The first should contain names of objects frequently used or observed; the second may contain action words, and the third adjectives in common use. The words are to

be pronounced one at a time, and the children are to write after each word is pronounced the first word that comes to the mind. The reactions are then to be studied comparatively. Several types will probably be found, and many interesting variations of several qualities of the associative process if a sufficiently large number of children are tested. The most characteristic response will be with words that express frequent and commonplace experiences. There will be pronounced differences in the kind of reaction that is most frequent, whether by words describing action, qualities, substances, relations. In some cases there will be a relatively large number of words describing recent or present experiences, and in others vivid or striking experiences or those of a personal or emotional nature will be conspicuous. Variations in other traits of association will be exhibited. In some cases there will be relatively a greater number of reactions that show that the thought first suggested by the word remains clearly in the mind; the reactions will be terms describing the object, or parts of it, or its qualities or use, or possibly naming some object that belongs to the same class, or some larger class to which the object itself belongs. In other cases the tendency will be to pass from the object given to some other different object as a whole. In these cases the connection may be obscure, showing looser association, or pos-

sibly a greater amount of content in the mind.

In studying the results of the association test, although it may be difficult to make numerical estimates of the characteristics that are involved, some estimate should be made of the amount of influence of recency, vividness, and frequency in determining the association, and also the prevailing form of connection: whether by similarity, when there is usually a passage from one object to another as a whole, or by contiguity, in which the response is a word that describes or refers to some other part of the same scene or object. It is not always possible to decide upon the nature of the association from the word that is given, but if a sufficiently large number of reactions are taken one cannot fail to discover something about the prevailing reaction habits of the mind.

Other differences in associative habits can be discovered by repeating the association tests several times at intervals of several days, using the same list of words each time. Care should be taken not to suggest an effort to recall the previous reactions. Children of the same age will be found to differ greatly with regard to the amount of repetition that will be found on examining their successive reactions. Some will respond with a majority of the old words; in other cases an almost entirely new list is likely to be written. For a quantitative meas-

ure of the variability the number of words that are different from the words of the first list can be counted.

Another method of testing association that will be found helpful in studying small children is as follows: — About fifty small objects are placed together on a table in a definite order. Among them are round, spherical, cylindrical, conical, circular, and irregularly round objects; there are several of the same general color but of different shades or tones, and some of other colors. Besides these, other groupings should be provided for such as objects serving some use: for example, toilet articles, articles belonging to the table, or objects connected with a Christmas scene. The following objects were used in a series of experiments made by the method: — Apple, red rose, peach, marble, card with Christmas scene drawn on it, a small piece of wood, plain white card, knife, blue paper, red sealing wax, seal to stamp letters, ball, card containing circle, picture of tea-kettle, round piece of wood, spool of cotton, tinsel, piece of pith, sandpaper, spool of red thread, red cloth, red paper, some pieces of variously colored cloth pinned together, a stone, small bottle containing vinegar, pencil, piece of candy, string of popcorn, cubical block of wood, small doll dressed in red, orange, picture card, button, sachet powder, nut, skein of red silk, glass, piece of lead, bottle of cologne, and the fol-

lowing words printed upon cards — cider, ice, violet, earth, teaset, pansy, Santa Claus.

In testing, the children are brought one at a time. The experimenter selects a round object, for example an apple, from the table, and gives it to the child with the direction to place it aside on the table and then to put with the apple all the objects that he sees on the table which he thinks ought to go with it. He is allowed to take all the time he needs to satisfy himself that he has selected all that properly go with the apple.

Several varieties of reaction will be found. Some children will select only spherical objects; others will select round objects but according to a broader concept, including objects that are irregularly round. Others still will select according to two or more concepts. Another type of reaction is that in which the child tries to construct a story or scene. Some will associate by individual resemblances and find a likeness in some particular between the test object and all the other objects on the table. The younger children tend to select according to a single resemblance such as roundness, or redness; those a little older more frequently use two or more concepts, and the oldest children in a group will be likely to react by individual comparison or several distinct resemblances will be kept in mind at once. Reactions appear to belong to two types, irrespective of

age. The bright, nervous child of any age is more likely to use the mixed reaction; another mental type is more prone to the single concept reaction.

Variations of the association experiment can be made by having children write lists of words as rapidly as possible. They can be asked to write twenty-five nouns, or twenty-five adjectives, putting down the first that come to the mind. Or they may be asked to write sentences, or to finish sentences half of which are read to them. Another experiment is writing of recent memories. The children can be asked to write about ten events that have transpired during the day. In all such products of the child's mind the same fundamental differences that were observed in other association tests are likely to be seen.

Association time, or the rapidity of the passing of the mind from one state to another, has been studied minutely, especially in the early period of experimental psychology. The usual method of testing is to measure the time that elapses between the pronouncing of a stimulus word, and the reaction word that is given by the subject. In testing children a word can be given and the children allowed a minute in which to write as rapidly as possible all the words that the given word makes them think of. Another method is to take the whole time

of association, using twenty words. The experimenter pronounces the words one at a time, giving the new word immediately after the child delivers his reaction. The time of the whole series can be taken accurately enough with an ordinary watch. Methods of measuring single reactions require apparatus, and for experiments upon differences will not be likely to yield better results than the more simple methods that have been described.

Rapidity of other mental processes that are largely mechanical in nature can be tested also. Such a process as adding, after it has been well practiced, is largely automatic in character, and the rapidity with which it can be performed is a good measure of the rapidity of mental processes. Sheets of paper containing sixteen columns of digits, twenty-five in each column, can be prepared. Have the child add for three minutes putting down the result at the foot of each column. The method can be used also in testing mental fatigue, and also for experiments upon mental tempo, and the relation of maximal to preferred rate of action. In testing for mental tempo a series of preliminary experiments should be made without suggesting speed, but simply asking the children to add the columns of digits. Later, experiments can be made for comparison in which the greatest possible speed is demanded. In all the tests quality as well

as quantity must be observed. Types such as rapid-accurate, rapid-inaccurate, slow-accurate, and slow-inaccurate will be found.

In testing for fatigue by this method work at greatest speed should be done for five minutes, and the point that is reached at the end of each minute indicated. The quantity and quality for each period should then be estimated. Fatigue as it is measured by such a method is the result of several factors: warming up, effect of practice, will attitudes, affect the result as well as actual fatigue of the neural processes that are engaged in the work.

REFERENCES

Works on Experimental Psychology previously mentioned.

XV

FREE ACTIVITY OF THE MIND

In the preceding chapters some of the differences in the mechanism of the mind were studied. The product of the functions of impression-receiving, retention, combination, and reproduction, is a mental content that gradually from infancy on becomes more complex, and more and more an organized stream of consciousness. Not only in actual experience do individuals differ in their streams of conscious-

ness, but in many other characteristics, such as volume, rapidity of movement, richness of connection, clearness of imagery, predominance of one or another form of imagery, and in many other ways differentiation into types and varieties appears. Some of the underlying factors of these differences have already been considered; now the results as they appear in the actual content of mind are to be noticed. Mind as we know it and use it in the practical business of life is a result of disciplining the free activity of consciousness, and choosing from an excess of partially coördinated elements those combinations that apply best to practical situations.

Children can be studied with special reference to the free activity of mind. In general do the activities of the child under observation indicate richness and variety of mental content, rapidity of mental action, flexibility of connections, or the opposite characteristics? A simple test of mental content can be made by asking children to think for two or three minutes about some familiar interesting object or scenes in which free play of the mind will be stimulated; such as a walk home from school, or a holiday. They are then asked to write all they can remember of what has been in the mind. More can be learned by questioning the child but the written report will show something about the individual differences in quantity and flexibility of mental content. By questioning

the child some information about the vividness of his mental imagery can be obtained, the extent to which details enter into imagery, the predominance of one or another of the sensory forms, as visual, auditory, or motor images, and emotional content.

Another experiment which will give similar results can be tried. A story or bit of description can be read to the children, and immediately afterward they are requested to describe what was in the mind. If characters appear in the story whose appearance is but suggested or left to the imagination, the children may be requested to describe in detail the appearance of the persons as they saw them in mind.

Other information can be gained from reports about the child's dreams. Description of a few vivid dreams can be called for, and children can be asked to tell the subjects of all the dreams they can recall. Questions can be included about what is seen just before going to sleep. These experiences differ with age, but differences among individuals will be found that are due to differences in mental constitution. Differences in the emotional background of imaginative activity should be noticed especially; sometimes in such tests the influence of morbid emotion or shock can be detected, and steps taken to remove it.

Experiments upon the traits under observation can be continued in several ways. Chil-

dren can be asked to describe in writing an imaginary animal, one they have never seen, nor read about, nor heard of. The quantity of the mental activity that results can be estimated by counting the number of descriptive units the child has used in his account. Many differences will be found. Some children will be unable to detach the mind from common experiences. They may describe some common animal, or, if they are original at all, the originality consists in duplication of parts, or enlargement of the animal as a whole, or in selecting parts from several animals. Some will show that the creature has not been visualized as a whole by making parts mutually contradictory, by describing in a haphazard order, or by mentioning but a few detached parts. Others will show powers of imaginative construction, for they will depart widely from common experience, carrying out their descriptions consistently. (See appendix to article on Reverie, Pedagogical Seminary, Vol. 5.)

An experiment that has frequently been used in testing imagination can be made to yield interesting results in this connection, showing differences among individuals in the use of similarity association. A drop of ink is put onto the center of a sheet of paper, and another sheet is pressed down upon it, until the ink is spread out irregularly. The child is then asked to write the names of all the objects the ink-

spot resembles, in the order in which they occur to him. A class experiment can be conducted by making the test material on a larger scale.

Other tests of the traits of mind that are being observed can be made as follows: — Copy upon the blackboard a page of a story that is unknown to the children, omitting letters and syllables, making what is called a mutilated text. The children are then told to copy the story and to fill in the missing parts. The copying is to be done as rapidly as possible. Both the time required and the accuracy or sense with which the work is done are to be noticed. The mental activity required in this test can vary from ability to notice the omissions to constructive intelligence, according to the character of the materials used, and the amount that is omitted. Some think that the ability tested in filling in a passage in which there is considerable mutilation is closely connected with general intelligence for school work, and that the differences displayed in such work are central to differences in types of intelligence.

The same ability can be tested in another way by announcing a series of substantives, and having the children fill in connecting words to make sense. Or words can be given and the children required to make as many sentences as possible in a given time using the words. Three nouns or three verbs can be given, and

the difficulty of the test depends upon the breadth or abstractness of the thought that must be constructed in order to contain the ideas that are presented.

Other aspects of the free activity of the mind can be tested in various ways. An interesting experiment can be made upon the child's power and habits of description. A picture is placed before the children and they are asked to write all they can think of to say about it. A picture that is complex in detail and contains suggestions for a story is best for the purpose. Several types of reaction are likely to be obtained; such as the imaginative, in which there will be a story; the observing, containing description of details; the emotional, commenting upon the artistic aspects of the picture or the emotions aroused by it; the informational, which gives information about the picture, or the scenes that it represents.

Writing of an original story about some suggested theme can be tried. A subject somewhat unusual in character should be chosen: a story about some object can be called for, as a book, pocketbook, chair, coat. Reactions can be made more uniform and somewhat better adapted to the purposes of comparative study if a part of the story is told or read to the children, and they are made to complete it in a way that seems best to them.

Characteristics of the child's use of language

should be observed in investigating the qualities of his stream of consciousness. Expressions of the face in speaking, and gesticulation should be observed as indications of the character of the mental imagery, and other qualities of consciousness. The word language can be studied with regard to its fluency, the relative proportion of words expressing action, quality, substance, the presence of vivid and emotional expression, rapidity of speech, richness of vocabulary. For further study of the child's language, typical specimens of his written word can be studied in detail. Topics can be assigned, such as description of a well-known object, or narration of some recent experience. To test the use of adjectives, such topics as "The best time you ever had," or "The worst time you ever had," can be used. Ability to explain can be tested by written compositions on "How to play baseball"— or some other game. Many differences in characteristics will be found; use of grammatical form, ability to make distinctions in meaning, rhythmical qualities of language all vary, and all in part indicate differences in the mental characteristics that are under observation.

For making a numerical study of the child's vocabulary, Kirkpatrick's test can be used. It is made as follows: — The first or last word of each sixth page of a dictionary is selected (use Webster's Academic Dictionary, 645 pages,

containing about 28,000 words). Ask the child to mark + each word of which he knows the meaning, and to mark — each word of which he does not know the meaning, and to mark ? each word about which he has doubt. By "understanding the meaning," it can be explained to the child, is meant, "If you should see the word in a sentence would you be obliged to look in the dictionary?" If, in addition, the child is asked to make sentences containing the words, the clearness of his concepts can be tested. From tests made by the method, Kirkpatrick estimated the size of vocabulary of children to be as follows: — Grade II, 4480; Grade III, 6620; Grade IV, 7020; Grade V, 7860; Grade VI, 8700; Grade VII, 10,660; Grade VIII, 12,000; Grade IX, 13,400. High School, first year, 15,640; second year, 16,020; third year, 17,600; fourth year, 18,720. The average for Normal School students was 19,000, and for college students 20,120. There was no constant difference due to sex. (See E. A. Kirkpatrick, "A Vocabulary Test," *Popular Science Monthly*, Vol. 70.)

REFERENCES

Wilson's Bibliography: topics Imagination, Reverie, Dreams, Imagery.

XVI

PURPOSIVE THINKING

Although no fixed line can be drawn between free activity and purposive thinking, for the purposes of observation and experiment, the distinction can be made. In general, intelligence can be defined as the power of the mind to adapt itself to new conditions. Whether there is such a function as general intelligence which can be put to exact test is doubtful; rather it seems that intelligence is the result of several complex activities, and that different degrees of intelligence may exist side by side in the same individual.

For present purposes it is not necessary to attempt a close analysis of the processes that constitute intelligence, but rather to observe the various kinds of action to which the terms "intelligent" and "unintelligent" are applied, and to study differences among individuals with respect to these actions. The ordinary exercises of the school do not test intelligence in a way to be satisfactory from the psychological point of view, for erudition is, by the nature of the case, a predominant result of the school training, and memory is brought to the front rather than original adaptation. Methods of testing intelligence, therefore, are best chosen that do not make use of the ordinary

school content. Several kinds of situation could be singled out for study. Intelligence of one kind, somewhat different from other forms of intelligence displayed in the school, seems to be required for parts of the mathematical work. Practical tasks that require modification of previous conduct to meet a somewhat new situation appear to be different in character from mathematical ability. When one makes reasonable inferences from observations, or applies analogy in drawing conclusions, still other factors of intelligence appear. Logical thinking is still another form of intelligent mental action, and the very opposite of another that is usually described as intuition.

In ordinary practical life, and, indeed, in most acts of thought, thinking is not of a precise or logical nature, but every individual has certain type-experiences or conclusions that apply more or less satisfactorily to the situations in which he finds himself usually placed. The intelligent person, other things being equal, is one who has a varied assortment of these type-experiences from which to choose. Ability to modify these reactions to fit particular conditions is a second factor of intelligence. If acts of intelligence are examined more closely, many variable traits upon which the larger aspects of the mental functions that have been described are based, will be discovered. In some cases, the power of holding steadily a complex mental

image seems to be the basis of intelligent action, and this is an ability that varies much among individuals; in such work as the arithmetical problems of the school, this ability counts for much. Other variables are: complexity of association, especially associations of similarity, the rapidity with which associations are aroused in the mind, the quantity of mental content that is aroused when a new situation appears.

To test the intelligence of an individual, then, is no simple matter, for there are not only several variables, but the intelligence is connected with all other mental functions in an intricate way. Before beginning experiment or observation, all the descriptive terms that are commonly applied to mental ability or intelligence should be brought together and carefully studied, to see what meanings are embedded in them. Individuals can then be observed and marked with reference to these terms. The ability in each school subject, as shown by the marks in examination and class work, should be ascertained. The opinion of several observers will be valuable, and if each will arrange a group of children in a series, with regard to what seems to be their intelligence, the uniformity of the ordinary methods of judging individuals can be determined. One may then proceed to examine intelligence more closely in some of its typical expressions.

Some of the characteristics of intelligence can be observed in the child's actions in the presence of a practical problem. An experiment adapted especially to young children will test the child's method of search. Thirty-six square blank cards are prepared and placed in a solid square. A piece of colored paper is then shown to the child, with the remark that it is to be put under one of the squares, and that he is to find it by taking up the squares one at a time, putting them back exactly as they were. The child's method of search is then observed, and if a numbered arrangement of the cards is fixed upon, the procedure can be precisely recorded. Many individual differences will be found. In some cases the search will be entirely a matter of trial and error, the child apparently not profiting at all by what he has done, but depending entirely upon chance. Others will proceed with some reference to avoiding working over the same ground twice, and some will adopt a perfectly ordered search. A variation is made by failing to put the paper under the card (changing the form of statement to the child), and then observing the process by which the child arrives at the conclusion (if he does) that the paper is not under any of the cards.

The same problem can be put in the form of a question, to which all the children in a class can write answers at once. A question like the following can be used: —

"There is a large square field, covered with tall grass, and your ball is lost in it. You did not see it thrown, and you have no knowledge as to what part of the field it is in. How would you go about finding the ball?"

Some of the practical problems that presented themselves to primitive man can be reproduced, with such modifications as are necessary to bring them under experimental conditions: for example, the problem of constructing a hammer from stone, thong, and stick can be used. A smooth piece of green wood, a long twine, and a thin stone of suitable shape are provided, and a knife. Several degrees of skill will probably be observed.

For studying phases of the intelligence that are brought to light in some kinds of mathematical work, such problems as the following can be used. They can be presented as written exercises, or can be arranged as experiments.

Two men come to a deep river, which they wish to cross. They find two boys in a boat that is just large enough to hold one man or two boys. Neither men nor boys can swim. How can the men get across in the boat? — If the problem is to be used as an experiment, river, boat, men, and boys can be represented by objects, and the child is requested to show how the men can be taken across. The experimenter should record exactly what the child does. Children as young as nine will be found,

who will give clear written answers to this problem. Although intelligent children will be found who will be confused in attempting to solve such a problem mentally, it is probable that a child who can give a perfectly clear answer has excellent intelligence of a kind that is used in some phases of practical thinking. Its essential factor seems to be the ability to hold a situation in mind steadily while its details are changed.

Similar abilities are required in solving problems of a type represented by the following: —

A boy goes to the pump with two pails, one holding three quarts and the other five quarts. How can he measure exactly four quarts? — If it is given in the form of an experiment, the whole procedure of the child should be recorded. Some will proceed by trial and error, not seeming to profit in the least by what they have already done, at last, perhaps, happening to hit upon the right method. At the other extreme are those who think the whole process through before they begin to act.

For further study of these traits of intelligence many forms of puzzle are adapted. The puzzle test made by Lindley *(American Journal of Psychology,* 1897*)* can be used, or other puzzles of this type. Usually the number of trials, or the time taken in the solution, is but a partial indication of the intelligence displayed. Everything the child does should be recorded,

and his own description of the process that took place in his mind should be taken. In cases in which exact quantitative estimates cannot be made, children can be grouped into three or more classes, according to the degree of intelligence displayed. If two or three observers grade the children independently, the accuracy of the method will be increased, or tested.

Some characteristics of the child's drawing from objects indicate degree of mental development or intelligence. An experiment performed by Clark can be used as a class experiment. An apple with a hat pin running through it is placed in such a position that the pin appears to enter the apple at a distance from the edge. The children are directed to draw the apple and pin just as they look. Three types of reaction will be found, representing three stages of mental development. The lowest form of reaction, usually predominating among young children, is a circle with a line passing entirely through it. The second stage is that in which the line is shown interrupted at each edge of the circle. The third represents the figure as it actually appears, the line entering the circle at one side, and meeting it at the other.

The child's conception of cause and effect, of proof, his use of inference and analogy can be brought to test in many ways. Problems like the following can be given as written exer-

cises: — Are you sure that the sun will rise to-morrow? Why, or why not? Was there ever a man named George Washington? How do you know? What makes the wind blow? How does powder make a shot go? What makes the sky blue? How does your mind make your legs go? What makes a top stop when you spin it? Why do dogs dislike cats? Of course, correct answers are not to be expected to such questions, but the manner in which the child's mind attacks the problem will reveal characteristics of his intelligence.

Passing now to processes that are commonly regarded as essentially rational processes, some simple tests can be made that will bring out the traits of the child's reasoning. Close reasoning involves one or both of two processes: (1) The discovery of similarity of behavior or characteristic among a number of objects or qualities; (2) application of a general principle or statement to particular instances. Most of the reasoning, both of child and adult, is but incompletely logical, but these two processes will be found in the most rudimentary form of reasoning. Test questions like the following can be used: —

In what way or ways are the following objects alike? Ball, apple, orange, marble, the earth, a circle? A spoon, a cent, a piece of glass, a wire, a watch? A pansy, rose, bluebird, robin, sunflower, tree? A spool of cotton

thread, needle, cloth, scissors, pins, thimble? A pocketbook, bag of popcorn, apple, doll, candy, orange?

Other similar lists can be prepared containing some common property or properties, varying in difficulty of detection. Both the quickness with which children can discover the common quality, and the correctness of the answers are to be taken into account in estimating the intelligence. If the questions are given as a written test, marks can be assigned as in an ordinary examination paper.

For testing ability to think deductively in logical form, test questions such as the following can be used. The child is to tell whether the statements are correct or incorrect and why:

All minerals come from mines; coal comes from a mine, so coal is a mineral.

A good teacher knows all about the subject he teaches; my teacher knows all about the subject he teaches, so he is a good teacher.

Almost all the organs of the body have some known use; the spleen is one of the organs of the body, so the spleen has some use.

Every city contains a cathedral; Liverpool contains no cathedral, so Liverpool is not a city.

All American silver coins are made by the government; a dollar is a silver coin, therefore all silver dollars are made by the government.

All people that pay taxes can vote; Indians

do not pay taxes, therefore Indians cannot vote.

Ability to distinguish clearly between correctness of statement and correctness of deduction will be found lacking in young children, but the manner in which the child approaches the logical problem will indicate something about the stage of his mental development. Other questions similar in nature, more simple or more difficult, as the case may demand, can readily be devised by the experimenter. Intelligence, it must be remembered, is shown quite as much by the nature of the process that is used to arrive at truth, as by the correctness of an answer. At times a wrong answer may indicate more intelligence than a correct one.

Although these tests do not afford means of exact quantitative estimate of intelligence, they will show several of the most fundamental characteristics of it. Study of a large group of children in such ways will show types of intelligence. A variety of tests applied to cases of eccentricity or deficiency of mind in school children will often detect the particular function or functions in which the deficiency lies. Children may be poor in arithmetic, for example, from one of several causes. If the exact nature of the defect can be found, special training can be applied at that point, or the work can be modified in such a way as to allow the child to use other factors of intelligence which he may possess in greater degree. If, for example, there

is mental confusion, as often occurs, on account of inability to maintain images steadily in mind, the use of objective aids in thinking may remedy the difficulty.

Systematic study of the language of the child should be made in studying the intelligence. Usually, subjects for composition not calling into play information gained in the school will be found best. Themes for argumentative writing will bring out some characteristics of the child's intelligence. Such themes as these can be assigned: Why is the United States a better country in which to live than Spain? Why is the United States the best country in which to live? Or why is it not? What is the most useful study in school? Should women be allowed to vote? The manner in which the child constructs arguments should be observed, and also his method of forming sentences, use of words and grammatical form.

REFERENCES

Experimental methods of studying intelligence will be found in some of the treatises on Experimental Psychology that have been mentioned. Under headings, reasoning, intelligence, thought, language, mental development, many titles will be found in Wilson's Bibliography.

Binet's Psychology of Reasoning can be read.

C. Spearman: General Intelligence. American Journal of Psychology, April, 1904.

H. P. MacMillan: The Diagnosis of Capabilities of School Children. Proceedings of the N. E. A., 1904, pp. 738–744.

H. W. Brown: Some Records of the Thoughts and Reasonings of Children. Pedagogical Seminary, Vol. II, 358–396.

J. A. Hancock: Children's Ability to Reason. Educational Review, Vol. XII, 261–268.

APPLICATION AND RESULTS OF INDIVIDUAL STUDY

I

A STUDY OF TWO CHILDREN

This chapter contains the results of a study of two children, twins, by methods similar to those described in the previous outline. Something about the nature of the questions that arise and the solutions that are suggested in the actual study of individuals can thus be shown. Even when the factors that are involved are as few and as simple as can be found, the study of individuals, with regard to their differences and likenesses, is full of difficulty, and problems arise to which only tentative answers can be given. As to the application of such imperfect knowledge to the education of the child, it can be said that, in any case, children must be educated, and in the way of understanding them some knowledge is better than none at all.

The study was made during the summer of 1903. The subjects are two boys, Harold and Earl, nine years old. Their home is in a little fishing village on the coast of the Bay of Fundy. Conditions were unusually favorable, in some respects, for analyzing and describing the traits of these children, and for obtaining

an insight into the causes that produced the traits. Environment was not only as simple as could well be found, but it was identical for the two children. They had never been separated for a whole day at a time, and they had never been further than a few miles from the village. The settlement contained the simplest elements of social life. The school was primitive, its culture material consisting of a prescribed course of texts. The children had read but little, and the books to which they had access were few. Heredity and environment, in a word, were identical for the two children, at least in all their gross aspects. Yet it is easy to see how differentiation can creep in, even in these simple surroundings. The factors that shape the lives of children are subtle. Small events sometimes seem to lead to large consequences. Slight differences in interest or ability may lead to selective action upon the environment on the part of the organism, and the environment so differentiated reacts to multiply and increase the original differences.

Though the lives of these two children had run so nearly an identical course, there was one divergence that may have had an important influence upon their differences. Two years previous to the time when the study was made, Earl had an illness that was diagnosed by the local physician as brain fever. He was ill four

weeks, made a good recovery, but had once since had a slight return of the trouble, and at times had been subject to headaches. During the illness he suffered greatly from sensitiveness to light and sound, and it was necessary to keep the house quiet and dark. The cause of the illness, the mother thinks, was sunstroke or over-heating. Following this illness, there was a loss of school for nearly a year, largely on account of headache when reading or studying, a difficulty that was still present at the age of nine. But the loss of the time at school, occurring, as it did, at the age of seven, was probably of less significance than might at first be thought, for the school house was next door to the children's home, and the boys were always together when out of school. The paucity of the school content must also be taken into consideration. The fact, however, that some of the differences of the children, plain enough at the age of nine, were first noticed by the mother after the illness of Earl must also be recorded.

The children are so-called identical twins. Their resemblance was so close that neighbors who had known them all their lives could not distinguish them. A teacher was troubled after a year's acquaintance. Even the mother could with difficulty identify them at a distance, unless they were directly facing her. But there

were minor marks, as, for example, in the distribution of freckles, that made identification entirely certain when it was necessary.

More careful and detailed observation showed likenesses and differences that were striking. The color of the hair, its degree of waviness, the configuration of the forehead line were alike in the two cases. Both children had the same irregularly shaped pigmented spots about the pupil of the eye, a characteristic believed to be so variable that it is often recorded for purposes of identification in police examinations. The ears, of which the lobes were of uncommon contour, were alike, so far as could be detected by inspection. Similarly in other marks there was great likeness.

When the children were observed directly in full face there was close similarity and yet plain difference. Earl's complexion appeared a little more delicate. The cheeks seemed less full, giving the appearance of greater length of the face, and also of greater width, especially between the eyes. The features seemed a little more clear-cut, the eyes larger, and wider open. Small as these differences were, they were distinct.

Seen in profile, there was the same general similarity. Earl's features appeared a little more sharply outlined, or better developed, especially the nose. The head appeared longer, and less rectilinear in outline.

Earl was taller and seemed more slender, especially in the arms and chest. The shoulders were more sloping, and apparently narrower. Earl's hand was thinner, narrower, and less firm in texture. The lines of the palm seemed identical in the two cases, so far as could be determined by inspection. Measurements confirmed these observations. Earl's height was greater by three-eights of an inch. The circumference of the upper arm, forearm, and wrist were all less by about the same amount. Head measurements showed the greater length and less width of Earl's head, the greater length of the face, and greater width at the level of the eyes. Width between the pupils of the eyes was also greater in Earl. Differences in weight were insignificant. Earl lost a little during the summer and Harold gained. Under similar circumstances, Earl's pulse was always slower than Harold's, and the heart sounds were less distinct. Earl's pulse was slow as compared with the usual rate for his age; Harold's appeared more typical. Earl's temperature was always lower than Harold's; all of these facts seeming to indicate the greater vitality of Harold. But the mother's opinion that Earl was the stronger child must be taken into consideration. Earl appeared older and better developed, but thus far less hardy and less vigorous.

Both children belonged plainly to the type

called the motor child. On casual observation, they appeared alike in their activities, but closer study began to disclose differences, some of them striking.

An experiment was made to test motor ability. It consisted of a series of trials, on alternate days, of tossing a ball at a target. In this test Earl was both inferior and also more variable in his records. In rapidity of making a movement Earl proved also to be inferior. A long series of trials at making short marks at greatest speed showed this, and the result was confirmed by other experiments, such as dealing a pack of cards. The conclusion that was drawn from the results of all the experiments of this character that were made was that Earl was inferior, both in speed and in control of voluntary movement. Effort was made, by giving rewards, to secure the best work of the children, but there was no way of entirely eliminating fluctuations of effort.

So far, voluntary movements made under experimental conditions have been observed. But when we came to consider movements of free activity, other differences were found. In general, Earl's activity showed more rapid and freer movement. This was well illustrated by the handwriting. Earl's was more rapid, more irregular, more like an adult's. Earl talked more, and more rapidly, and with greater flexibility of movement and tone. In many

other characteristics of movement traits appeared that seemed to be related to or based upon those that have been mentioned. For example, in running, Earl was more likely to start before the signal, as though there were greater readiness for movement.

The characteristics that were thought to underlie some of the traits that have just been described were finally put to test by experimenting upon the relation of maximal to preferred rate of movement. The movement that was chosen was flexing and extending the hand. A series of trials was first made without suggesting speed, and later tests were made to test the maximal rate. Although no differences in the latter were discovered that could not be due to errors of observation, Earl's free movement was decidedly more rapid. This seems to be in correspondence with Earl's greater impulsiveness and impatience. In running he was more eager to get to the starting point, or at least to be on the move in some direction, for he was also more likely to take a devious way in going, showing, as did other actions, a tendency to greater amount of movement, less definitely directed, less perfectly controlled, and so performed with greater waste.

In school Earl made more unnecessary movements. He more often changed his position, and more often assumed awkward attitudes. When talking or paying attention he made more

movements of face and body. The expression in speaking was more active; there was more play of the features. There was a greater number of eye movements; he looked more animated and brighter, again showing the greater volume of free movement, and the tendency to lack of control.

These facts lead to the conclusion that though Earl was more active he was really less a motor child; for Harold's actions were more definite and under better control. In other words, they were more practical, more likely to produce results. He was more industrious, and when neighbors wished a boy to do errands, Harold was almost always selected. He was more helpful in the house, more often seen at work in his father's shop, less given to idle occupations.

In movements that required strength Earl fatigued more rapidly. This was true of activities like running, holding out a weight at arm's length, and in smaller movements, as making marks for periods of from three to five minutes. Earl's fatigue curve in the last mentioned experiment showed greater variability, and indicated greater fluctuations of effort which, however, it was not possible to distinguish with certainty from other factors. In larger movements physiological evidence of fatigue was greater in Earl. After running the heart recovered less quickly its normal rhythm,

and breathing was more affected. Earl's heart was often slowed by running and the pulse slightly diminished in volume. This is not an usual effect of such exercise as was experimented upon, and although there was certainly no organic disease, and no pronounced functional disturbance of any kind, the nervous control of the heart was less perfect in Earl.

There were occasions, however, when Earl showed greater control of movement. At work that he particularly liked, as work in the hayfield, he was decidedly superior. The testimony of those who had often observed the boys together was that under such conditions Earl could do twice as much work. He had, too, corresponding to these fits of activity, periods of listlessness and apparent fatigue. He was decidedly less regular in his expenditure of energy than Harold.

Some of these facts may appear to give conflicting results, but when they are considered all together these contradictions seem to disappear. In the case of Earl there is a greater quantity of natural movement, accompanied by greater profusion of automatic or secondary movement; a condition that makes for greater fatigue. This movement was carried on habitually at greater tension, and at rates more nearly the maximal than in the case of Harold. But it was likely to be less effective, when judged by actual results, because it was less definitely

directed and applied, in part because of less precise application of effort, and in part, it seemed, because of actually less ability to control movement under ordinary stimulation. But under the influence of unusual stimulus, Earl's nervous system appeared to be aroused to greater power than Harold's was capable of, apparently both as to quantity and quality of work.

Turning now to more purely mental qualities, other differences of traits will be found, which in part throw light upon the facts that have already been discussed, and in part still further complicate the problem. As to morals, Earl impressed several observers as being not so good a boy as Harold. Among these observers was a teacher who knew the children well. But a difference of opinion on the part of the mother must be taken into account. The teacher said that Earl was less likable, not so good-natured, nor so polite; that he cared less about doing his work well. Earl was more bold, inclined sometimes to impertinence and argument. He was less obedient and less dependable. The mother could find no differences in such qualities as truthfulness and honesty, but she declared that Earl was better tempered, that he took things less seriously, was more sunny and laughing, and was a tease; while Harold was likely at times to be sulky, sensitive, and morose. Some of these differences

were certainly striking. Especially as regards teasing, there was a great difference between the two children.

Earl's greater boldness in social relations was expressed in many ways. He was more difficult to control in experiments; he more frequently asked for favors or to be released from obligations. He was more daring, and always the leader when the children were away from home together. Earl always acted as spokesman. He answered questions habitually that were addressed to both. He frequently introduced subjects of conversation. He seemed always to be more confident of himself than Harold, and Harold readily admitted the superiority of Earl, even in matters in which it did not exist.

Earl appeared less sympathetic, and less affectionate, less frank, both at home and in school. He did generous acts less frequently, and more often acted apparently to show off. He was less saving of money, especially of any considerable amount. Earl was more resourceful in mischief, more often being seen with one or two boys apart, with evidence of planning mischief. Harold was more likely to be seen in a larger group. Earl was subject at times to peculiar balky spells, in which he refused to obey orders. This was noticed both in school and in the experiments. What mental state accompanied them was never determined. In

general, in all the characteristics that have just been mentioned, Earl seemed more mature and more independent.

Harold seemed to be the more emotional child. His relatively less activity, his bashfulness, his moodiness at home, his greater sensitiveness, greater docility, his reactions to praise and blame, all indicated this.

In qualities of interest there were some conspicuous differences in the midst of general similarity. Harold was more patient and persistent in performing tasks. In Earl the competitive spirit seemed better developed. Harold apparently tried harder to please, and was more conscientious in his work. He appeared to regard work more seriously, and seemed genuinely pleased at praise, which seemed to affect Earl less. Harold always appeared willing to try, but he seemed never to expect to do very well, and he was never very persistent. Earl had the greater capacity for acting with enthusiasm, and also the enthusiastic person's fault of soon exhausting the momentum. The teacher found, in general, the same traits in school work that were found in other activities. Earl was more impatient, and always in haste to get to the next step. Harold was more willing to "rub out and try over." These differences appeared on examining the copy books of the children, made during the previous year. Earl's careless, hasty, and ir-

regular work appeared in strong contrast to Harold's neat and careful writing. Earl's writing showed the swing and dash of an older person's, and the inattention to the formation of the single letter. In many ways Earl showed his unwillingness or inability to follow the letter of instruction. He was impatient of detail, disliked dull or routine occupations, seemed often to be in a hurry. Earl had more special interests and enthusiasms, and was more subject to spurts in effort. In school he was interested in arithmetic and did well in it, much better than Harold, but he did but indifferently in other subjects. He worked well at anything that was easy for him. Harold worked about equally well at everything, but he liked best the motor occupations, such as drawing and writing.

Experiments by such methods as reading to the children while they tried to add columns of figures, showed that Earl was more easily distracted. In school he was more often inattentive, responded more readily to slight distractions, looked up more frequently from his work without apparent cause, was more subject to dreamy states.

Experimental study of the senses and perception yielded, for the most part, but doubtful results. Earl was apparently superior in rapidity of mental processes. He perceived more rapidly, and could take in more at a glance.

Experiments upon literal memory, including

repetition of both visual and auditory stimuli, showed the unmistakable inferiority of Earl. His ability to repeat rules and definitions learned in school during the previous year was much less; likewise his ability to reproduce a paragraph after five minutes' study.

In rapidity of a complex mental process Earl was superior. This was shown in work done in several experiments made for other purposes, and was also separately put to test, by the method of adding columns of digits. In this Earl was much superior.

Several methods of testing association were tried. The experiment to which most importance was attached was one in which the same series of twenty words, presented by the single reaction method, was used on six occasions, at irregular intervals. Earl's reactions were much less uniform; that is, they contained fewer repetitions, and indicated a more variable mental process. Earl's associations were, as a rule, more difficult to trace, as though more took place between the stimulus and the reaction. He more frequently passed from one object as a whole to another. Harold more frequently reacted with a word describing some quality of the object, as though the mental imagery were more clear and more stable and perhaps less in quantity. Attempts to follow up this clue by having the children try to describe their mental imagery confirmed this view; for, although Earl's

powers of description were decidedly greater than Harold's, he could give a less clear account of his images. It was concluded from these introspections that Earl's mental content changed more rapidly than Harold's, and that images were more complex, but less clear. In other words, the mind was richer in content and more active. It was noticed, too, that recent experiences and objects in the immediate environment were more frequent causes of the reactions of Earl than of Harold. The results of these experiments were corroborated by others, such as writing, description of pictures, the ink-spot test, drawing, and description of an imaginary animal. The drawings especially showed characteristic differences though they belonged to the same type. Earl's drawings were more complex, had more ornamentation, were larger and freer, and less carefully drawn.

Many aspects of general intelligence were observed and investigated. Intelligence, if we mean by it adaptation to new conditions, was greater in Earl — a conclusion that agrees with the verdict both of teacher and parents. Experiments upon practical intelligence gave clear results. Primitive man's problem of constructing a hammer from thong, stick, and stone was presented. The result was much in favor of Earl. He cut the stick to fit smoothly against the side of the stone, made a loop in the twine, put the stone and the stick together loosely

through it and wound the remainder of the twine coarsely about, making a fairly well-jointed hammer. Harold cut a groove around the stick, and tried to tie the stone to it at right angles with it. Failing in this he tied it, letting the stick run across the hammer head with the result that he made a loose joining. Neither of the children thought to split the stick, and insert the stone.

Similar experiments were tried with similar results. Earl was unmistakably more resourceful at such tasks. He suggested more, whether rightly or wrongly, when neither could discover the correct solution.

In a test consisting of selecting similar objects from a collection in which there were several possible classifications, both selected to form a single group, round objects, but Earl's concept was broader than Harold's. He included objects of doubtful roundness such as a match. Harold selected only spherical objects. Attempts to carry further the study of the children's use of concepts by experiments in which they were asked to find similarity in objects, and to name objects similar to those presented, failed to bring out differences. The children were not sufficiently developed mentally to react fully in such experiments. Problems to test their notion of proof, of cause and effect, appreciation of logical form all failed, partly for the same reason. At least no differences were

found that had not already been discovered by other methods.

With the experiments upon the intelligence the study was brought to a close. It is easy to see how under different conditions a much more thorough diagnosis of the characteristics of these children could be made. Many more experiments could be performed, made by more refined methods, and with the application of better psychological analysis than was attempted. But even so rough a study as was made brought to light many differences, and seems to lead to several conclusions. The differences that were discovered do not seem to be entirely unrelated, but in many cases to be dependent upon one another or to be offshoots from the same stem. Other differences seem to stand apart as independent. It would be very interesting to know to what extent the illness of Earl had affected his characteristics. It is possible that the sensitizing or exhaustion of the nervous system incident to his illness has left permanent traces that appear not only in physical characteristics but in the mental action as well. This cannot be proved from the evidence, and can merely be suggested as a possible solution of some of the problems that are raised. It is possible on the other hand that the germs of all the differences existed from the beginning and that they have merely been brought out by the effect of environment.

The question that must have arisen in the mind of the practical reader, as to what pedagogical conclusions can be derived from such a study of children, must be considered. Do the differences that can plainly be distinguished in the temperament and mental habits of these children indicate a need of differentiation in the manner of educating or controlling them? Both these children belong to a normal type; physically there are no pronounced defects or tendencies to disease; they are free from mental defect; and they are morally good, as children go. As to what the special fitness of such children for life work may be the study certainly furnishes but little if any evidence; nor would a refinement of it do so. Such children are probably plastic and under the right conditions can be made efficient in any one of several perhaps rather widely different occupations.

The most marked faults of these children appear to be quite opposite in the two cases. Earl's haste and restlessness under routine tasks amounts to a fault that appears deep-seated, and to permeate many of his activities. Children so constituted are likely to lay too slight foundations, later in life, upon which to build practical efficiency. They have natural versatility, but are likely to be deficient in all matters of technique. And they are more dependent than the stable child upon circumstances placing them where their enthusiasms

will be stimulated. Probably this fault cannot entirely be eradicated from such a child; it must be watched, and controlled by providing opportunities for the child to follow out his natural interests.

In the other case the fault lies in the opposite direction. There is too little confidence and perhaps too great inclination to follow the letter of instruction. Such children do well in many places but they sometimes lack initiative. They need encouragement to depend upon their own judgment, and to appreciate their own work. That they can be changed into the type possessing the characteristics which they lack seems hopeless to expect, even if it were desirable. One of the lessons to be learned from a study of temperament is at least to know what not to attempt.

These are the main lines upon which a differential pedagogy of such children would work. Neither child is an extreme example of the faults or virtues which he typifies. They fall within the class of the normal safe average; healthy, normal, bright children, rather strongly motor in type with as yet neither marked abilities nor great faults.

Galton's study of twins made many years ago led him to conclusions that are interesting and important to quote in this connection. He made a study of the likenesses and differences of twins, and found that the most conspicuous dif-

ferences are in such traits as sociability, desire to attract attention, truthfulness, thoroughness, and refinement. Most of the differences in identical twins he thinks can be traced to differences in energy in one or another of its protean forms. One will be more energetic, fearless, vigorous; the other gentle, clinging, timid. One will be more ardent, the other calm and placid; one more independent, original, and self-contained; the other hasty, generous, vivacious. The native factors he thinks are the real causes of the differences, not the intercurrent causes, to which the differences are often ascribed by parents.

Binet's suggestion of possible correlation among traits, resulting from a study of two children, is also in point here. He finds that the most conspicuous difference between the children he studied can be expressed by saying that one is variable and the other stable. With the variable type go idealistic tendencies, a tendency to be unpractical, mobile, original, inventive, capricious. With the stable temperament goes a tendency to be practical, reflective, well-ordered, conservative, well-balanced, uniform, regular, exact. He does not conclude however that these traits are necessarily correlates.

II

TYPES OF INDIVIDUALS

It must soon be apparent to an observer of individuals that, though the factors that make up individuality are so complex and so variable that no two individuals can be alike, yet there are certain types and classes. Such studies of children as have been suggested in this outline should have brought to light several pronounced types, and several points of view from which individuals can be classified. These can now be discussed a little further.

For a certain practical purpose school children can be separated into two groups; normal and abnormal. Some children, the great majority perhaps, impress one as being and are proven by test to be essentially sound; in morals, intellect, and physical constitution. They may not be brilliant, nor massive physically, nor highly spiritual, but there is a normality that appears in every trait, a harmony, it can be said, which appeals to the æsthetic sense. These children are likely to do well under all ordinary circumstances of life; their success does not appear to depend upon chance, or a happy selection of environment.

Into another class can be placed those children, and we do not know how many there are, that are abnormal or exceptional. Both the

types that are included under this class seem to depend more than the normal upon the conditions in which they are placed, and the manner in which they are trained, for their success in life.

For practical purposes, again, the subnormal children can be separated into classes according as the defects are physical, intellectual, moral, or any two or all of these. The most prevalent type appears to be the child who, though bright enough to make headway in the school, and free from serious moral defects, is feeble in constitution, or afflicted with some diathesis or disease that limits his progress as an individual, and perhaps endangers his offspring.

The second is the abnormally dull. There are all degrees from the child who is stupid or confused in some one branch of school work to the actually feeble-minded.

The third type is the morally deficient. The most hopeful of this class are the children who are bad because of bad environment. Moral badness can be produced in almost any child by environment, and happily can be corrected by improvement in the environment.

Among mixed types the neurotic bad child, with alcoholic or other bad nervous heredity, and with physical marks of degeneracy is the worst school type considered personally, socially, and biologically.

The child above the usual in one or many characteristics is another school type that is frequently found. Excess of ability or eccentricity of mental constitution may not be often of the genius order but in many cases it is sufficient to make the child ill-adapted to the routine of the school.

Another type is the child who is conspicuous for some peculiarity, excess, or defect in the sphere of the emotional life. There may or may not be physical defect.

Other schemes of classification of children for the practical purposes of the school could be adopted, that should take into account qualities like ambition, interests, special attainment or ability, mental type and the like. Temperament, emotional characteristics, and various other traits can be used for classification purposes, according to the object in view. Many attempts have been made, especially by French psychologists to classify temperaments and characters, and some of their schemes are valuable as guides in observing children. The most nearly complete of these seems to be the classification plan adopted by Ribot. He makes first a distinction between real and amorphous characters. Amorphous characters are those in which hereditary traits are weak, and to a great extent determined by environment. They have no distinctive features nor permanence. The real characters are

divided into two great classes; the sensitive, and the active. In the sensitive character feeling predominates; in the active, movement. To these two classes can be added a less numerous but quite distinct class, the apathetic, in which both feeling and action are less than normal, or as they appear in the great majority of people. This character is not plastic like the amorphous. Possibly another character needs a special designation, the balanced, or temperate, that has no great distinguishing feature.

Each of the main divisions that have been described Ribot divides into species. Thus there are three divisions of the sensitive type; the humble, the contemplative, the emotional. The active temperament has two types; the mediocre in which mental ability is small, and the great active in which there is great mental ability. The apathetic temperament also has two types, divided according to mental ability; first the pure apathetic, with slight sensibility, slight activity, slight intelligence; second, the apathetic with a powerful intellect.

Besides these pure types, as they might be called, Ribot finds various mixed types; among them the sensitive-active and the apathetic-sensitive. There must be distinguished too what might be called substitutes for character, or partial characters that result from some mental aptitude or from some great and dominating emotion.

Many other classification schemes could be mentioned; they are so common in the history of character-study that it would be impossible to describe them all, though each has something of value.

Perez classifies temperament on the basis of movements; their rapidity and energy. His types are the slow, the lively, the ardent; then, as mixed types, the lively-ardent, the slow-ardent, the deliberate.

Fouillée attempts to classify temperaments by describing them in terms of certain physiological traits which he thinks underlie them; that is, according to the manner in which expenditure and restoration of energy take place in the nervous system. Volition and muscular action are predominantly of the nature of expenditure; sensation and perception, the contrary. The two types are the sensitive and the active, each with two varieties, for in the response of the nerve cells there are two fundamental qualities, quickness and intensity. Four principle classes of temperament result: (1) sensitives with quick but not intense activity; (2) sensitives with slow but intense activity; (3) actives with quick, intense action; (4) actives with slow and moderate action.

Seeland, a Russian writer makes still another classification. He detects a hierarchy of characters passing from the stronger and more normal to the weaker and less normal. There

are three classes: strong, medium, and weak, and several varieties of each. Among the strong are the gay, and the phlegmatic or calm; and under the gay again the strong-sanguine, the weak-sanguine, and the serene, everything depending upon the way in which the nervous system responds to internal or external excitation.

Two more recent suggestions for a classification of temperaments and mental types can be mentioned; both have already been referred to in another connection. Binet finds in studying intellectual processes, types that can be characterized as stable and variable. Stern finds a difference that he believes to be fundamental and a basis for division into intellectual types; that is, a difference in habit of individuals that allows them to be classified as objective and subjective. This difference between objective and subjective habit he finds running through habits of perception, attention, apperception, judgment, and even in simple motor reactions. He concludes that this is the very center of differences in mental constitution.

All such suggestions for classification of individuals are helpful for they at least give hints for further study. Most of them are based upon the study of adults; to what extent they will serve also in the study of children is not entirely clear. The character of the child appears in less sharp outline, and to a certain

extent character is still in a state of flux in the child, or as it can perhaps better be said, exists in fundamental characteristics and has not so clearly worked itself out into the traits that are more easily observed.

REFERENCES

Ribot Psychology of the Emotions.

III

PEDAGOGICAL ASPECTS OF INDIVIDUALITY

Many practical questions arise when children are considered as individuals rather than as a class. However strongly entrenched one may be in the group theory of education, in actual practice the individual demands attention. There is always the abnormal case with which educational forces must deal, and every good teacher is always profoundly conscious of the individual and his special needs; and is aware that the information dispensing function of the school reaches but a part of the individuality of the child, the one-tenth it can be said, that appears above the surface. The emotional life which contains the root of individuality is in a large measure submerged. Yet the comprehension of the submerged nine-tenths on the part of those who teach and control the child seems vital and necessary.

The question arises as to what extent the school as such can be expected to view the child as an individual, and to what extent training in the study of individuals should form a part of the preliminary education of the teacher. The problem comes sharply to view in considering the health of the school child. What ought to be expected of the school and the teacher in the way of knowledge about the health of each individual child, and in efforts to correct deficiency in the health? How much knowledge of physical defects should be expected of the teacher? Should the school provide for expert examination of the physical condition of each child?

Again, what can the school be expected to do for the exceptional child; the child who never can be made to fit into the routine of the school; not only the subnormal and defective child but the eccentric and exceptionally gifted. Must effort constantly be made to bring these children up or down to the average of the group, or must they be regarded as different in kind from other children, and separately taught? If so, from what source is the information to come to guide in the practical treatment of them?

Can the school take into account early in childhood the strong interests and capacities of children, and early provide differentiation of training to meet the needs of different types of efficiency? What, again, can the school do

about those deep-seated differences in character and temperament that are so little touched in the ordinary routine life of the school? What provision can be made for understanding and assisting the child whose emotional life is unstable, and for warding off the dangers that confront the moral delinquent, the timid, and the anti-social child?

Can we reasonably expect of the school that it be so informed about mental differences of children as to enable it to treat the child as an individual with reference to differences in mental type, and so to teach him along lines of least resistance, and to adopt methods of teaching especially suited to his intellectual type? What can be done for the child whose greatest limitation is the poverty of cultural elements in his home environment?

Whatever shall finally be the decision about these matters and other questions that arise when the needs of individuals are considered the organizations for training of teachers and administration of education find these questions more and more pressing with the increasing complexity of social life, and the differentiation of individuals. The condition of the modern school in the large city well shows the difficulty that confronts education. These schools contain individuals of many nationalities with ideals and occupational tendencies widely differing. Compared, for example, with the teacher

in a small country community where conditions are more uniform, the city teacher stands in ignorance about the personality of those she teaches. Either, it seems, the school must confine itself more and more to the training of those superficial functions that individuals have most nearly identical with one another, and which can be understood by the casual observer of the individual, or the school must confess that it works more and more in the dark; for that is surely the case if it pretends to care for the whole child — unless forces are at work that increase the knowledge about individuals on the part of teachers, or relieve them of the necessity of possessing such knowledge.

The deficiency is in part compensated by increased specialization in the work of education and care of the young; as by the development of the department teacher and provision for more subjects, better taught; by the appearance in the school system of the medical expert, and the like; but, on the other hand, it is in just such a partition of the person and the distribution of him into the hands of specialists, that the individual as a whole is lost from view. But the correction does not lie in the direction of retrenchment of specialization, but in accepting the natural result of social development, and making the study of individuals itself a specialty. Already, as we have seen, that is

what is beginning to happen. The methods of studying variability in several sciences now begin to unify the problem of individuality. In the practical work of education also there is a beginning of specialization of interest favorable to the application of the increasing knowledge of individuality which is gathering in scientific quarters. This differentiation is shown in several ways; by such departments as the medical office of the school system, the department of physical culture, and anthropometry, the psychological expert, the school visitor whose duty it is to investigate the condition of the school child at home, and to mediate between the child and the school; by various societies which have as a common aim to secure the welfare of children, and which for the better pursuit of their practical purposes investigate more or less the individuality of the person whom they try to help. All these aid in the centralization of forces that makes for a better knowledge of individuals. In those favored cases in which teacher, physician, psychological specialist, and intelligent parent cooperate in studying the interests of a child almost ideal conditions are already obtained. The purpose of a conscious interest in the problems of individuality on the part of the school would be to make these conditions more general.

Whether in the near future there will be de-

velopment and centralization of the scientific aspects of the study of individuality such as appears to be gathering on the practical side remains to be seen. In Germany there is already a growing institute whose function is the application of psychology to practical problems, one of which, and in fact the leading problem, is the study of individuality. Such a method of approaching the problems is especially needed in the study of individuality because of the variety of special interests that must be combined and concentrated upon a single purpose. For not only must the methods of studying individuals be derived from several sciences, but contact must be made in a helpful way with those who are to apply this knowledge to the particular problems of the individual; this from the very nature of the case is different from other applications of science to practice, in which the application can be derived from a general rule.

What is needed is an institution in which shall be concentrated all the methods applicable to the study of the individual, and which shall also serve as a central point for the dissemination of practical knowledge, the training of experts, collection of literature, and even work in examination of individuals, or assistance to those who are practically engaged in such work. This is speaking of ideals; yet the establishment of such an ideal method of procedure

would be but in line with what is being done in other departments of science no more important; and in fact not different from what is being done elsewhere.

In conclusion, every one who deals practically with individuals should be fully conscious of what being an individual actually means. It means, primarily, to be conscious of power of will and free choice, of having the necessity and the privilege of carving out one's own fortune. But it means also isolation, to be shut up within one's own experience, to have perhaps but small insight into one's own nature and the forces that shape it, to be incapable of expressing this individuality fully to anyone; to be therefore but half understood even by the most conscientious helper. This inherent loneliness and isolation of individuality may be to the individual its most real meaning, and may become the cause of the greatest tragedies of human life.

Not only therefore is the problem of the individual one of the greatest both for science and for the practical life but it is a problem that increases in importance as life becomes more complex and as individuals become differentiated in character and experience. What could be more unscientific and less in accord with our present-day ideals of efficiency in all pursuits of life than to attempt to direct and control our fellows with but the most casual and superficial knowledge of their real nature as

individuals; of that which is not expressed in any one function or part, and which therefore no study of parts and functions by themselves will disclose — the individuality.

And yet such a state of ignorance is prevalent to-day not only among teachers but in all the professions.

THE END

INDEX

M

N

O

P

T

V

W