SPECIAL TALENTS AND DEFECTS

Their Significance for Education

BY

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PREFACE

THIS book has proceeded haltingly, as must be evident in many places, for it attempts to explore and describe a field that is not well illuminated. The actual examination of those mental functions which are relatively dissociated from general intelligence has not been carried far by experimentalists. However, the problems have been sufficiently formulated, and enough evidence has been secured, to warrant attempts at gleaning implications for education, even now.

Mine is the comparatively humble task of bringing together in an ordered presentation the works of original investigators, in such a way that they will be available for application. The appeal of the data is above all to educators, but also, of course, to those who deal in any office with human beings.

The chief difficulty in organizing the subject has been to delimit it, as regards the psychology of the elementary school subjects on the one hand, and mental measurement on the other. It is not the purpose to cover either of these fields in the present volume. Yet so closely are they related to the study of special aptitudes in school children that it will be scarcely possible to obtain the very clearest view of what is here written without additional knowledge of these matters.

It will be observed, also, that there has been no attempt here to teach introductory psychology. It is assumed that readers of this volume will be acquainted with the vocabulary of elementary psychology. The time has definitely passed when it was either feasible or desirable to present all topics in a single volume. Those who would learn what modern educa-

tional psychology has to teach now expect, first of all, to equip themselves by study of a general introductory text.

The lists of references are selected, not complete. To present complete bibliographies of all works bearing immediately or remotely upon every topic treated would cumber the volume inexcusably. References have been selected for these lists because they are historically indispensable, because they contain information of fundamental importance, or because they summarize much previous work. I believe that the selection is such that from the books and articles listed it will be possible for the student who wishes to do so, to construct the complete bibliography and history of each topic, up to the present time.

The hundreds of teachers who have sat in the lecture room of Professor E. L. Thorndike will see how many guiding suggestions for this volume have come from that source. Professor W. A. McCall has given counsel on certain chapters. Many investigators and publishers have extended courtesies, which are acknowledged through the references, and to which attention is here gratefully directed. I am indebted to Dr. John S. Richards, Medical Superintendent of The Children's Hospital, Randall's Island, New York, and to Mr. L. L. Kolburne, student at Teachers College, for assistance in securing illustrative material for Chapter VII. Finally, I have enjoyed the advantage of editorial supervision by Professor M. V. O'Shea.

My chief hope for the volume is that it may contribute toward the welfare of school children compelled to attend upon prescribed education, without due regard for their idiosyncrasies of original endowment.

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EDITOR'S INTRODUCTION

WHEN the writer of this introductory note began teaching, it was popularly believed that a pupil who showed special excellence in intellectual work or in some particular study owed his superiority to a faithful and energetic will which held him to his tasks until he had mastered them thoroughly. It was generally believed, also, that marked deficiency in school work as a whole or in a special subject was due principally to a lethargic or indifferent will which could not resist distractions and temptations to self-indulgence. In those days, pupils were upbraided and even physically chastised if they failed to prepare the lessons which were prescribed for them in any study. The writer has often seen pupils whipped because they failed in their spelling, arithmetic, reading, history, or grammar. When punishment was administered in the school it was frequently repeated in the home, since parents quite generally entertained the view that failure to perform intellectual tasks satisfactorily was due to negligence or laziness, and it was thought that the best way to correct such delinquency was to arouse the will, usually by means of dermal stimulation. In his early experience as a teacher, the writer never heard, either in training classes or in teachers' institutes, that pupils possessed special talents or defects which were certain to be manifested in their school work because they were established by native endowment which could not be modified to any large extent by rewards or penalties.

But we are gradually abandoning the view that either brightness or dullness in general or in special directions is due primarily to volitional control or the absence of it. During

the last few years, experimental studies have impressed the principle that individuals differ in their inheritance of special capacities. Dr. Hollingworth shows in this volume how far we have gone in the detection of special talents and defects, with particular regard to the work of the school. She shows in preliminary discussion what notions people have entertained regarding the nature of ability, and then she discusses methods of measuring ability, alike of a general and of a special sort. She discusses the bases for differences among individuals in ability in respect to various intellectual traits or functions. Then she presents in detail what is known to-day regarding special talents and defects as revealed in the more important subjects taught in the schools.

We believe in these times that the school should to the fullest extent provide opportunities for each pupil to develop his talents as completely and as rapidly as possible. It is still required in most public schools, though, that pupils in any group should be kept quite close together in their educational progress, even when they show marked differences in ability in particular subjects or in the entire work of the school. But the pressure is becoming constantly greater to arrange school programs so that pupils may go forward as rapidly as their abilities, either general or special, will enable them to do, while those who are deficient may receive help according to their needs. There are already a number of experimental schools and school systems in which the principle of individual differences in ability is recognized and applied to a greater or less extent. One may safely predict that we shall find a way in time so that the principle may be recognized and applied in all public schools.

Dr. Hollingworth's book lays a sound foundation for the differentiation of pupils in a school or classroom according to special abilities or deficiencies. It can be read by teachers

who have not had extensive study of educational psychology or statistical methods of investigating such problems as are treated in this volume. The book is written in a graceful style, and technical matters are discussed in an unusually clear, simple, and attractive way. It may be confidently asserted that any teacher who has charge of thirty or forty pupils — or a smaller or larger number — will be helped to understand individual traits of excellence or deficiency if she will read what Dr. Hollingworth has presented in this volume. It may be safely stated, also, that a teacher will be more sympathetic toward pupils who experience difficulty in mastering special subjects of study if she will become familiar with the facts and conclusions which this book contains.

M. V. O'SHEA

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May, 1923

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CHAPTER I

Preliminary Discussion

I. Speculation concerning the nature of ability

Since reflective men began to record their speculations, theories have been expressed concerning the nature and relationships of mental functions. Plato in *The Republic* contemplated the importance of knowledge in this field. "Come now and we will ask you a question: when you spoke of a nature gifted or not gifted in any respect, did you mean to say that one man will acquire a thing easily, another with difficulty; a little learning will lead the one to discover a great deal; whereas the other, after much study and application, no sooner learns than he forgets; or, again, did you mean that the one has a body which is a good servant to his mind, while the body of the other is a hindrance to him? Would not these be the sort of differences which would distinguish the man gifted by nature from the one who is ungifted?"

In *The Republic* the use of mental tests to discover the caliber of the mind is foretold. "We must watch them from their youth upwards, and make them perform actions in which they are most likely to forget or to be deceived, and he who remembers and is not deceived is to be selected, and he who fails in the trial is to be rejected. That will be the way?"

Aside from the speculations of scholars, folk-notions as expressed in proverbs are interesting, especially as showing what men wish were true concerning human talents and defects. Many of these proverbs embody the idea of a compensatory distribution of abilities: if I am weak in one respect, I am sure to be strong in another; if I am a failure now, I shall probably be a success later on. "Every dog has his day." "Homely in the cradle, handsome at the table." "Slow but sure." "Easy come, easy go." This doctrine of compensation satisfies certain cravings of human nature, and is therefore likely to be held wherever people have not given impartial attention to the results of experimental investigation.

Folk-wisdom has also seen men under mental types. According to the theory of types, the human species is divided into separate categories, with respect to mental constitution. There would thus be the musical and the unmusical, the quick and the slow, the imaginative and the unimaginative, the eye-minded and the ear-minded, and so forth. The observable complexities of behavior have further led to the description of a given person by a combination of type-terms, as, for example, "quick-musical-imaginative," or "mathematical-accurate-unimaginative." Persons thus classified by types, are thought to be of "different kinds," "equal" but "unlike." Two persons are thus compared as an apple is compared to an orange. Both fruits are "equal," but of "different types." People, according to this conception of human nature, are not thought of as differing from each other simply in amount, as an apple is compared with a larger, a smaller, or a sweeter apple. Comparison in terms of amount is disagreeable in some respects, so that uncontrolled speculation would surely tend to favor the theory of distinct types.

Type-terms have also been invented for temperament, — sanguine, choleric, melancholic, phlegmatic. The idea underlying this classification is that everyone belongs to one or another of these distinct temperamental types, and, furthermore, that there is a relationship among types which warrants fixed hyphenated categories.

The mental traits or "faculties" thus classified and hyphenated are conceived as entities, having each its distinct existence in the individual mind, and being susceptible to general training and strengthening, by prescribed exercises. Thus it has been believed that "the observation" may be developed by exercises with particular materials, so that all materials whatsoever will be observed equally or approximately as well.

Speculation has been much occupied, as the history of human thought shows, with the problem of the origin of individual endowment. Many different possible explanations were proposed, before the day of quantitative measurement in psychology. It has been surmised that mental endowment is the result of prenatal influences, the wishes and environment of the mother, during the period of gestation; or that it is the result of education; or that it arises from the physical accidents met with by the organism; or that it may be inherited from ancestors, as physical traits rather obviously are. On the whole, speculation has favored the notion that mental endowment originates in the environment. The idea that ability is hereditary, determined for each by the conditions of ancestry, is repugnant. Man prefers to consider that he can himself determine what he will do and be. This doctrine will not be tenable if it is admitted that talents and deficiencies are determined in the germ-plasm, from which the organism springs; that man can only use, not choose, his mental endowment.

II. RESULTS OF QUANTITATIVE INVESTIGATION

Many of the cherished hopes and desires of mankind concerning itself are in some part violated by the teachings of scientific psychology. Experimental psychology is not yet half a century old, dating its beginning as a technical science from the founding of Wundt's laboratory at Leipzig, in 1879. Therefore, it is clear that the study of these problems by quantitative methods brings us very close to the present day.

When the problem of measuring mental capacity was first taken into the laboratory, the modern definition of *a mental function* began to be formulated. It became apparent that a mind must be judged by its product. The measurement of *performance* is the only approach there is, or probably ever will be, to the measurement of mind. On this basis it was found impossible to identify or measure any such function as "the reason," "the memory," "the observation," "the imagination," "the will," and similar supposed entities. *A mental function* came to be defined as "*an actually or possibly observable event in behavior.*" Thus, memorizing digits, detecting absurdities, and reading English print are examples of mental functions, in the sense in which the term is used throughout the chapters of this discussion.

Other terms which are used to refer to performances or "events in behavior," are *abilities* and *capacities*. A prolonged discussion might be conducted, in an attempt to assign different technical meanings to these words, and to bring out fine shades of distinction among them. For instance, it might be claimed that "ability" should be reserved to signify capacity *plus* the skill acquired by practice, if any; while "capacity" should mean the innate aptitude, apart from all training. However, since capacity in this sense can never be known, but can only be inferred from the degree of actual

performance, under controlled conditions, it hardly seems necessary to maintain such distinctions for our purpose. Refinements of nomenclature will, therefore, be avoided, and the terms *mental function*, *capacity*, and *ability* will be used interchangeably, to denote performance which depends on the inborn integrity and sensitivity of the individual.

By way of clarifying the definition of a mental function as "an actually or possibly observable event in behavior," we may quote from Spearman's presentation of the distinction between "observation" as a mental function, and "observation of birds' nests." Spearman says: "Suppose, for instance, that a school boy has surpassed his fellows in the observation of birds' nests. His victory has, no doubt, depended in part on his capacity for the general form of activity known as 'observation.' But it has also depended on his being able to apply this form of activity to the matter of birds' nests; had the question been of tarts in the pastry cook's window, the laurels might well have fallen to another boy. A further influence must have been exercised by the accompanying circumstances; to spy out nests as they lie concealed in the foliage is not the same thing as to make observations concerning them in the open light of a natural history museum. Again, to discover nests at leisure is different from doing so under the severe speed limits prescribed by the risk of an interrupting gamekeeper. The boy's rank may even depend largely on the manner of estimating merit. Marks may be given either for the gross number or for the rarity of the nests observed; and he who most infallibly notes the obvious construction of the house-sparrow may not be the best at detecting the elusive hole of the kingfisher." One cannot, therefore, identify and measure "observation." One can only measure "observing birds' nests, of all kinds, at leisure," or "observing rare birds' nests, under stress of pursuit,"

and so forth, which are "actual or possible events in behavior."

As one may glean further from Spearman's discourse, it has been shown that most of the mental functions performed by men are not elementary, but consist of the coördination of complex factors, capable of analysis. Reading the English word "cat" from a printed page is, for instance, a very complex function.

The application of quantitative methods to the study of mental functions as thus defined, quickly revealed the fact that human beings, sampled at random, in large numbers, do not fall into distinct types. On the contrary, they yield one unbroken curve of distribution in the function measured, clustering around *a single type* (or mode). In all mental functions which have been measured, there has been found but one type — the average human type — from which the individual members of the species deviate in degree (though not in kind). The majority of individuals deviate but slightly from this biologically established type or mode. "The typical" in ability is, indeed, by definition, what the greatest number of people *can do*. From this performance of the *average* or *typical* person, a few individuals deviate widely in the direction of superiority, while a corresponding few deviate widely in the direction of inferiority. No doubt the conspicuousness, because of their infrequency, of extreme deviates in respect to any given function (or capacity) has led to the notion of separate types of mankind. Mental measurement shows clearly that men cluster closely around *one type* in mental traits, just as they do in such physical traits as height and weight. All men can be no more divided into the dull and the bright, than they can be divided into the tall and the short. The eye can see that most persons are best described as medium, in height.

This principle of *one type*, with deviations in both directions from it, in a measured trait, holds throughout organic nature. The study of it in all its bearings is called the study of individual differences. When the traits involved are mental, we speak of the psychology of individual differences. It is one of the marvelous facts about human beings that of all the millions born, no two are just equal in possession of a given trait, except by chance; and no two are identical in their combinations of traits, for the infinite possibilities of permutation practically exclude identity by chance. These combinations, which go to make up *personality*, are combinations of *amounts* of the same traits. This must be clearly understood. The mental classification of men under different "kinds" is a myth. All show the same kinds of functions; but they show all degrees of performance in these functions, within limits which are extremely wide, with multitudinous possibilities of combinations of functions, in different *amounts* of each.

There are, therefore, not types. There is *one type* — the typical or *most frequently occurring amount* of performance in a function — from which there is divergence among the individuals born, in various degrees. Is it possible to construct a picture of this fact, so that it may become concrete through visual representation? Psychologists have given us many such pictures, in the forms of curves platted from their measurements. We may cite as an example, Seashore's curve of distribution for the ability to discriminate among intervals of time, which is one element in musical sensitivity. Seashore measured a large number of adults in this respect, with the result that is pictured in Figure 1.

Where the curve rises to its greatest height, at its peak, there the greatest number of those measured fall in respect to this function. That is, therefore, the human type, in

sense of time. The typical individual has that amount of this trait. On each side of the type fall deviating persons, their frequency decreasing rapidly as the amount of deviation becomes greater. Very few persons in ten thousand have that amount of sensitivity to time represented by 95 – 100; and, on the other hand, very few are so inferior as to fall at the lowest point measurable on this scale. *The typical person* has that amount of the trait represented by 85–75, approximately. Distinct types, such as "sensitive" and "insensitive," do not appear, as a result of mathematical

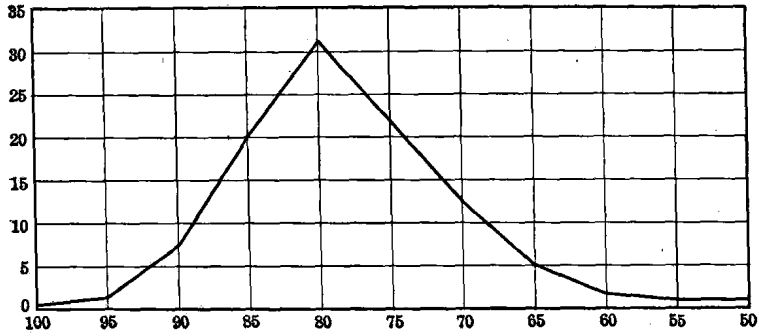

FIG. 1. — Distribution of ability to discriminate among intervals of time, the subjects being adults. (From Seashore's *The Psychology of Musical Talent*. Reproduced by courtesy of Silver, Burdett and Company, and of The Columbia Graphophone Company.)

distribution. But a few extreme *deviates from the typical* appear, — the superior in sensitivity and the inferior in sensitivity.

Occasionally it is possible to illustrate in nature, to the eye of the man untutored in the derivation of scientific laws, the form of this distribution. This happens, for example, when a very large flock of birds rises and passes overhead, during migration. Being tested in flight, the birds will be seen distributed somewhat as suggested in Figure 2. Not all are equally swift and enduring, but they deviate from a single