multitude of disconnected papers. As an outcome of suggestions made at the Dundee meeting the section will meet with the anthropologists to discuss the educational value of museums. A discussion on the function of the modern university in the state promises to be very attractive, as the heads of the newer universities, including Sir Oliver Lodge, have promised to take part. The president of Stanford University, Mr. Alfred Mosely and Miss Burstall, of the Manchester High School for Girls, are also expected to contribute to the discussion. The discussion arranged with the psychological subsection of Section I will be concerned with the general question of the need for research in education, and with the specific researches which have been made into the vexed subject of the psychology of spelling. Two other discussions will be concerned with manual work in education and the registration of schools. The importance of the latter question was brought out by a committee at the Dundee meeting, while the importance attached to manual training is shown by the new emphasis which is now being laid on it in educational practise.

Professor T. B. Wood will preside over Section M (Agriculture). In his address he proposes to review the results of twenty years' work in agricultural science, to point out the successes and failures, to discuss the reasons for success or failure, and to endeavor therefrom to make suggestions for the future. As already stated, the section will engage in joint discussions with the botanists (on barley culture) and the physiologists (on the physiology of reproduction). Communications will also be made to the section by Sir Richard Paget, on the possibilities of partnership between landlord and tenant; Professor Fraser Story, on German forestry methods; Dr. H. B. Hutchinson and Mr. K. McLellan, on the partial sterilization of soil by means of caustic lime; and Dr. Winifred E. Brenchley, on the weeds of arable land.

THE PRINCIPLE OF MENTAL TESTS

THE standpoint of applied psychology is implicit in the conception of mental tests. They represent a group of procedures, usually of simple technique, developed so that our knowledge of individual differences may, as Cattell puts it, be employed to guide human conduct. To justify themselves, they must earn their bread in terms of usefulness for the questions of life. In this respect they differ from the leisure-class problems of true psychological science, which are exalted above these vulgar necessities.

Two broad functions of psychological tests are distinguished. One is the measurement of changes in individuals under controlled differences in experimental conditions. The studies of Hollingworth on caffeine and of Winch on the effects of school work are among the recent examples of this type. Here the problem has usually been defined in the determination of central tendencies. To this limit, measurements can be made with comparative reliability, because the external conditions are well controllable, and the errors due to subjective factors tend, on the whole, to compensate. That is, a gain of 10 per cent. in the same individual for a second performance represents a gain of 10 per cent. in the same abilities as were concerned in the first performance. The more difficult question of just what these abilities represent in the individual case has been a secondary one for these studies, not usually coming into prominence.

It must be squarely faced, however, in the other function of psychological tests, that of measuring and interpreting the differences between individuals under similar immediate conditions. One may not say because Peter is 10 per cent. better in a memory test than Paul, that it is due to a 10 per cent. superiority in the same abilities as Paul's. It is not a difficult matter to construct tests in which consistent and certain individual differences ap-

pear. The quicksand begins at the next step; that of constructing tests which shall have a useful meaning. Individual differences in the tapping test are exquisitely clear through many aspects of the experiment; but what these individual differences represent in the personality of the subject we do not know. The problem of mental tests is duplex; to construct a test at once free from physical and physiological inaccuracies, and one that shall have a useful significance for the subject's adaptation to life. Without the first the second is unattainable; without the second the first is futile.

The questions of interpretation must not be taken too lightly. Psychological experiments of the present class must consistently represent those mental properties of the individual that it is desired to compare, properties such as it is useful to know about. The value of mental tests depends upon their correlation with the personality of the subject; and the essential task in the scientific development of any mental test is to determine how well it indicates some phase of the subject's personality.

Because it is much easier to do, we have been apt to develop handy psychological methods and then try to make them mean something, rather than to start from the things that are important to know, and trying to develop methods for determining them. But to start with the tapping test as a measure of voluntary motor ability, or with the A test as a measure of rate of perception, is too obviously approaching the problem at the wrong end. We must not be bound by the notion that one test tests one thing, another test another; one test usually tests several things, and it must take several tests to test one thing well. First must be known the direction our inquiries must take; a task whose extreme complexity demands analytical and systematic observation of human behavior, not to mention insight. Then one may seek to develop measures which shall be themselves reliable, and shall show the most constant relation to the elementary traits that are to be measured. The test is never an ultima ratio. If we want to determine how good a test the average daily wage is of the number of applicants for poor relief, we must have other, most reliable information of the number of such applicants. In the same way, in order to know how far any mental test is a reflection of personality, we must have accurate knowledge, from other experiential sources, of how this personality compares with others in the phase we may be testing.

Mental faculties differ a great deal in the completeness with which they are experimentally covered. Those mental tests are of the best assured value where the use made of the method is immediate so to speak in terms of its own result. Thus we may interpret a test of astigmatism in terms of its own result, because it represents a nearly constant attribute of the individual, unaffected by other uncontrolled factors. A test of color-blindness can be interpreted in terms of its own result, to decide on the fitness of the subject for railway or marine service. But this is not so much the case with the strength tests, such as are used in the gymnasiums. A person may test quite high on the dynamometers who can not make nearly so efficient use of his strength, or actually not be so strong, as one who can not make so good a record with them. Practical life puts the eyes to the same test that the Snellen types do, therefore they are a good test; it does not put the muscles to the same test that the dynamometers do, therefore they are an inferior test.

There is in our experimental literature a happily growing tendency, as exemplified in the work of Healy, G. G. Fernald, Simpson, and others, to submit the tests of the higher mental processes to the test of concrete experience. The most prominent result of this Fragestellung has been the series of graded tests. We wish to be able to say that a child has in certain ways the ability of an 8, 9 or 10 year old. Therefore we determine what degree of these abilities is actually characteristic of 8, 9 or 10 year old children. Just as, if we wished for a test of honesty, we should try to find some way in which persons known to be honest differed from persons known to be dis-

honest. Of course the child is ten years old only in those respects covered by the tests. And the striking results reported by Miss Weidensall at Cleveland illustrate that there are other mental factors, most important for adaptation to life, that are not reached even by the inclusive scope of the Binet tests.

This fundamental weakness, one which is shared very liberally with the remainder of mental tests, seems to be that they are too much concerned with processes that for want of better names we sum up under intellectual capacity and intelligence. External competence, not to speak of subjective balance, depends also upon the capacity to make the intellect effective in the vital activities. An important further obstacle to making it thus effective arises when accompanying feelings are such as to make the proper reactions in any way disagreeable or less agreeable than other reactions which are less objectively adequate.

It is difficult to estimate how much of the significance in our present mental tests may be lost through failure to attend to these factors. Three persons go through the number-checking test; one in 140 seconds, the other two in 100 seconds. But the check-marks of the first two are all made in consecutive order, at regular intervals, while the third works erratically, skips back and forth, marks now very fast, now very slow. Probably this subject differs from the second far more significantly than the second does from the first. Any one might have the highest intellectual standing. The regularity with which a voluntary task is performed, the attentional control over it, and its freedom from subjective interference is to my mind a far more important thing to observe than the absolute efficiency in some task but remotely connected with really vital reactions.

Yet most of our psychological tests pretend to measure maximal capacities of some sort, and this maximal capacity is taken to indicate the subject's essential response to the test. It is so in some simple tests, as those of the astigmatism type; but when the test is more complex, as the above-mentioned, gross efficiency is the product of many factors that are to be interpreted only on the basis of other, more analytical controls. This is only a part of the subject's whole reaction to the test, and is the less important part the less the test is related to the struggle for existence. In these tests it is not so important how much the subject does as what he does. The manner of dealing with the situation represents the more fundamental traits; four minutes of method with Healy's puzzle box is better than two minutes monkey-fashion. But because these factors are exceedingly difficult to describe and measure, the workers dealing with mental tests, who as a class are occupied with large masses of data gathered with relative perfunctoriness, are apt to pass them by.

The adequate interpretation of mental tests further requires that we understand their relation to the subject's emotional reactions. It is interesting to know that you can methodically take up Healy's puzzle-box and open it in fifty seconds; but it is far more important to know whether, if you were caught in Healy's puzzle-box, and expected your enemy at every moment, you would preserve the same effectiveness of your reactions towards it. In what ways and to what extent is affective sensibility manifested in the subject? How much does the effectiveness of a performance depend upon its position in the affective scale? How to measure this is what we are responsible for finding out; though I venture to predict that the answers, of which there will have to be many, will come not so much in terms of a capacity, like addition, or memory, as in terms of a tendency, like the individuality of free association responses, or the types in arrangements of relative position scales.

What has the author tried to do—how has he done it, and—is it worth doing? This is the framework on which we used to be told to construct a review. And so in reviewing the question of mental tests, it is endeavored to indicate that their proper task is the measurement of functions concerned in the mental adaptation to life, and how they can best perform it through giving a well-proportioned recognition to the intellectual, volitional and affective spheres. How much it is worth doing

is unwise to speculate on where it has been very inadequately done. The crucial question is if it will always be necessary, in order to correctly interpret our tests, to already know so much about our subject, that the test gives us no added information. To-day this is true in all the more complex mental processes; and it is not improbable that, as our tests are improved, a better understanding of human conduct at large will develop. This brings more into the foreground the quantitative features of experiment; to tell us something good to know more accurately than we could otherwise know it. It is the form and direction of the tests that has to be dealt with now. If we do not first interpret our tests by our subjects, we shall never understand our subjects through our tests.

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THE FOURTH INTERNATIONAL CONGRESS OF SCHOOL HYGIENE

As has been already announced the fourth international Congress of School Hygiene meets at Buffalo from August 26 to 30. The congress is under the patronage of the president of the United States and Dr. Charles W. Eliot is the president. The vice-presidents are Dr. William H. Welch and Henry P. Walcott. The secretary-general is Dr. Thomas A. Storey, College of the City of New York, New York City, U. S. A., from whom programs and further information can be obtained. The congress meets in three sections, for each of which a large number of papers is announced on the preliminary program. The sections and the subjects covered are as follows:

Section 1. "The Hygiene of School Buildings, Grounds, Material Equipment and Upkeep." This section will include papers on topics related to the location, plan, construction, equipment and up-keep of city, village and rural schools, open-air schools, private schools, boarding schools, summer camps and special schools for backward, truant, delinquent, deficient, defective and deformed children, *i. e.*, site, architecture, decoration, ventilation, illumination, cleaning system, plumbing, toilets, sewage disposal, school furniture, school books, water supply, drinking facilities, bathing facilities, swimming pools, school grounds, school athletic fields, fields for games, sport and play, lunch rooms and equipment, gymnasium, social rooms, rest rooms, libraries, laboratories, class rooms, study rooms and lecture rooms.

Section 2. "The Hygiene of School Administration, Curriculum and Schedule." This section will include all topics concerned with the hygienic factors found in school administration, curriculum and schedule as they apply to country, village and city schools; and to the modifications necessary for the best interest of our various special schools. Papers on such subjects as the following would belong to this section: Hygiene of the teacher; hygiene of the child; hygiene of the janitor and other school employees; hygiene of the schedule, growth and age; school fatigue; need for and management of school lunches and school baths; influence of the seasons; study periods; home work; recesses; vacations; athletics; the problems of heredity in relation to school hygiene; overcrowding; the teaching of hygiene; the training of teachers of hygiene; special phases of hygiene: as personal hygiene; oral hygiene; preventive hygiene; educational hygiene; community hygiene; sex hygiene; play; physical education; domestic hygiene; puericulture, and first aid; special plans for and results from the instruction of backward children, truant, delinquent and crippled children; the economics of school hygiene; relation to the home.

Section 3. "Medical Hygienic and Sanitary Supervision in Schools." This section will receive papers on the management, operation and results of medical, hygienic and sanitary supervision in public, private and special, country, village and city schools, colleges, universities and professional schools.

Such subjects as the following will be included: The control of health inspection; sanitary supervision; the organization of health departments in schools; the relationship to the board of health; the equipment, training