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BY

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## Psychological Tests in Vocational Guidance

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Psychological tests in Vocational Guidance are of two sorts. Those of the first sort have for their aim the selection of people for positions. Such tests are now being put into practical application in several occupations and industries. They vary in kind from the simplest sensory tests to complicated evaluations of complex mental operations.

Among the simplest of such tests are those for vision, hearing, and color discrimination given to all recruits in the army, navy, and marine corps. Similar but more exacting tests of the same sorts are given to candidates for licenses as pilots and for positions as officers of ships.

Railroad employees and in some cases those of street railroads are subjected to tests of vision, hearing, and color discrimination. In the case of the trainmen, the color discrimination tests result in the rejection of about four per cent of the applicants. The tests are repeated every two years for all the men and at intervals of six months for those suspected of defects in color discrimination. In all of these cases the tests have for their object merely the detection and rejection of unfit applicants.

In at least three industries, psychological tests are in use which are more highly developed in character and which have for their object the more difficult task of selecting from among all the applicants those best fitted to perform the work.

The first instance is the work of Mr. S. E. Thompson, who used reaction-time tests in selecting girls for the work of inspecting for flaws the steel balls used in ball bearings. This work requires quick and keen perception accompanied by quick responsive action. Mr. Thompson measured the reaction-time of all the girls and eliminated those who showed a long time between stimulus and reaction. The final outcome was that thirty-five girls did the work formerly done by one hundred and twenty; the accuracy of the work was increased by 66 per cent;

the wages of the girls were doubled; the working day decreased from  $10\frac{1}{2}$  hours to  $8\frac{1}{2}$  hours; and the profit of the factory was increased.

The second of the three cases is the work of Münsterberg of Harvard, in testing street-car motormen with the object of selecting those least liable to be responsible for accidents. From several viewpoints this problem is of great practical importance inasmuch as some electric railroad companies have as many as 50,000 accident indemnity cases per year which involve an expense amounting in some cases to 13 per cent of the annual gross earnings.

The motormen were examined by means of a somewhat complicated laboratory apparatus constructed for the purpose of testing their powers of sustained attention and correct discrimination with respect to a rapidly changing panorama of objects, some moving at different rates of speed parallel to the line of vision of the subject, and others crossing it from right and left.

The results of the experiments showed that the tests were fairly accurate in sorting the motormen out as to their efficiency as demonstrated by actual service. The tests require about 10 minutes for each individual. Even in their still unperfected form their application would result in the rejection of about 25 per cent of those who now are employed as motormen. There can be little doubt that this would result in a large reduction in the number of deaths and injuries from street car accidents.

The third and last example of the application of psychological tests to the selection of employees in industry is the series of tests of telephone operators. These also were conducted by Münsterberg.

The American Telephone and Telegraph Company employs some 23,000 operators. Applicants for positions are given a preliminary training of three months' duration in the company's schools during which time they receive salaries. So many eventually prove unfitted for the work that more than a third leave within six months, involving a financial loss to the company running into very many thousands of dollars each year. The object of the tests was to develop methods whereby the unfit girls could be eliminated before instead of after entering the service.

The girls were examined with reference to memory, attention, general intelligence, space perception, rapidity of movement,

accuracy of movement, and association. The results showed that the girls who gave the best results in the tests were most efficient in practical service, while those who stood at the foot of the list failed later and left the company's employ. It seems fair to conclude that when such tests are perfected, short examinations of a few minutes each will prevent thousands of applicants from wasting months of study and training in preparing for a vocation in which they cannot succeed.\*

In the cases so far reviewed, the persons tested have been applicants for positions. With a somewhat different purpose Prof. James E. Lough of New York University has tested beginning students in stenography and typewriting to determine which ones possess the abilities which will enable them to succeed. The tests used are designed to measure the subject's ability in habit formation. The experiments are still under way but already results have been secured which warrant the conclusion that a method has been devised which successfully separates the fit from the unfit candidates.

In addition to these cases in which psychological tests are being successfully applied to vocational problems, several pieces of experimentation are now under way to develop similar tests for marine officers. Ricker of Harvard has constructed apparatus for testing chauffeurs. Whipple of Cornell has done some work with tests for motormen. Seashore of Iowa has published a most careful study of tests of the ability of a singer. So far as is known, no work in this general field is being done in Europe.

All of the tests referred to up to this point are of the sort mentioned at the outset. All of them have as their purpose the selecting of persons for positions.

The second sort of psychological tests in vocational guidance are those having for their purpose the selecting of positions for persons. Up to the present time, none has been developed, although expressions of a longing for them and faith that they will ultimately be discovered are features of the literature of the vocational guidance movement. Even definite attempts in this direction are few. In Chicago, Dr. McMillan is doing some hopeful work. In Cincinnati, Mrs. Wooley has records of tests of the intellectual abilities of 800 children and records of their

\* Note: The accounts of the tests of motormen and telephone girls are taken from "Psychology and Industrial Efficiency" by Hugo Münsterberg, Houghton, Mifflin Company, Riverside Press, Cambridge, 1913.

industrial success or failure, and hopes to correlate the two sets of data.

In various parts of the country vocational experts are at work who base their decisions not on the results of psychological tests, but rather on character diagnoses made from an inspection of the applicant and from a general evaluation of his answers to questions about himself. The defect of this method is that the questions are put for the purpose of revealing the personality of the subject, but since the replies cannot be evaluated until the questioner has some basis for knowing with what degree of truth and significance they have been answered, the whole effort tends to move in a circle. Some of the experts who employ these methods unquestionably secure good results, but until their tests become objective rather than merely observational and until the results are definitely recorded so that they can be accurately studied, it cannot be claimed for them that they have attained the dignity of scientific status and reliability.

Nevertheless, the present situation is that we already have some tests for selecting people for positions and no tests for selecting positions for people. The reason is not far to seek for in one case the problem is vastly more simple than in the other. When we select people for a position, our problem is to sort out the more fit from among the applicants. This involves the development of methods for discovering the degree to which each candidate possesses the needed qualifications for one kind of work.

When the object is to select a position for a person, the problem is to discover which one of a vast number of possible sorts of work the person is best qualified to do. The difficulty arises from the almost unlimited number of possible alternatives.

At the present time we possess a rudimentary knowledge of the qualifications demanded in four occupations,—those of inspector of bicycle balls, motorman, telephone operator, and typewriter. Moreover, in the cases of at least two of these occupations the tests required for even a rough sorting of the applicants are numerous, long, complex, and must be given by a trained psychologist.

Now the total number of separate classes of gainful occupations listed in the Occupational Index of the United States Census is 9,326, and many of them should be split into several sub-divisions. This reveals something of the magnitude of the

task of sorting children out according to their vocational destinations.

Nor is the mere number of our occupations the only difficult feature to be faced. Modern industry is subdivided into occupations of which teachers and psychologists have as a rule slight knowledge. For example, if we open the Occupational Index to "S" we find a list like the following:

shooter	skidder	slaughterer	slugger
shoveler	skimmer	sleeper	smelter
silker	skinner	slider	smith
singer	skiver	slipper	smoker
sizer	slasher	slitter	smoother
skeiner	slater	slubber	snapper
			soldier

Now, when we propose to guide children into vocations, we must remember that large numbers of them are going into just such vocations as these. It is true that only a part of the 9,326 gainful occupations are available to the children of any one locality. It is also true that the same sorts of tests would undoubtedly serve for many different occupational examinations. Again, we must remember that we are using a false analogy when we refer to fitting square pegs into round holes in talking of vocational misfits, for people and positions are both plastic, not rigid, and much mutual change of form often takes place without injury to either person or position.

Nevertheless, even after all allowances are made, the inevitable conclusion remains that in vocational guidance the greatest field of immediate development for psychological tests is in choosing persons for positions rather than in selecting positions for persons.

The possibilities in the former field of effort are inspiring. When the best possible adjustment shall have been attained between work and workman, each one will have his full opportunity to achieve at least something for commonwealth and commonweal. The tasks of the world will be better done and the workers will receive greater rewards, deeper joy, and fuller satisfaction in their doing.

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