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By

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Psychology has passed from the stage of mysticism to that of science. Because it supplies a need and because its subject matter is not being satisfactorily dealt with by any other science, it is becoming more and more autonomous.

The past decade has witnessed an extensive application of scientific management. Skilled students have studied not merely the theoretical aspects of industrial inefficiency, but have applied and are applying those theories to actual conditions in industrial situations. The old method of scientific management evolved remedies for many mechanical deficiencies of our present system. The refinement of machine processes, the utilization of formerly wasted by-products, and the other diverse forms of scientific industrial management, have all contributed materially to the elimination of industrial inefficiency.

But thinkers in this field are awakening to the all-important fact that mechanical efficiency alone will not solve the problem of industrial inefficiency. Such a modus of attacking the ill can attain valuable but restricted results. The most important factor in this complex problem is not the machine which by the adoption of scientific processes and improvements is made to produce two units instead of one; but the vital factor upon an improvement of which all thorough progress must be predicated is the human organism in industry.

Since the human element is the fundamental factor in production, the application of intelligence to the improvement of industrial conditions from the human side and the attainment of a sympathetic understanding between the employee and employer is of paramount importance in industry.

The evolution of mechanical improvements considered by many of the old school as a panacea for industrial ills required of those students directing such developments a thorough knowledge of engineering principles. This newer and far more comprehensive movement toward industrial efficiency likewise requires a special knowledge but the knowledge is not of machinery, but of the human mind. For the human side of industry revolves about that fundamental factor the mind. To understand the mental reactions of workers toward their tasks and their attitudes toward their employers, specialists in the industrial field are calling to their aid that complex and as yet faintly defined science, psychology.

One of the major causes of industrial inefficiency is to be found in the methods utilized in filling vacancies both in the ranks and in the high offices of the great army of the employed. The methods formulated in recent years to standardize machinery and processes and to determine the best possible working conditions of factory and workshop promised valuable results to the employers; but these methods failed completely to solve the problem of inefficiency.

Standardization of machinery was a help but our problem of inefficiency will remain unsolved unless we can learn to deal economically with the placement of the human element in industry and employ the individual workers in occupations where they can use their particular abilities most effectively.

The reason why this problem of economical placement has been slow in occupying the attention of the public has been due to popular lack of knowledge and to the indifference of the employers occasioned by the over supply of labor.

For each individual, it may be said there is one occupation which is more suitable than any other, and in every occupation some succeed better than others. The greatest inefficiency in industry today is traceable to the misfits. This is due to the fact that we have known nothing of intelligence levels beyond a crude appreciation of the fact that some people are of a higher mentality than others, and we have failed to try to fit the man to the job. The search for the general principles which should enable men to find their aptitudes for certain vocations or occupations has been long and arduous, and it is only recently that a scientific mode of procedure is becoming possible.

Boys and girls, ambitious to earn their own living and to take their places in industrial activities, pour themselves eagerly into the world of industry through any available openings. They have had

no means of learning either the extent of their powers or the range of possibilities open to them in the labor market. Hence, they are most often misfits and the market is constantly flooded with adolescents. In addition, there has been since the Industrial Revolution a permanent surplus in the adult labor market. The management has been able for these two reasons to dispense with psychological fitness and to make haphazard placement of workers because they could always 'hire and fire'. This practice has involved a large labor turnover with its attendant economical loss and tremendous social ills.

It was with astonishment that we learned during the war, when we ascertained what men had done in civil life, how many had passed from occupation to occupation until they had finally found something which suited them. This wasted effort seriously affects the employers also, for the cost of training workers is unnecessarily great. Mr. Cody* states that "the cost of changing help in offices has not been accurately investigated; but careful figures compiled by a well-known firm of automobile makers show the cost of replacing a skilled mechanic to be over eighty dollars. First, there is the cost of finding the man and putting him on the pay-roll. Then, there is the cost of teaching him the special requirements of the particular position. It takes him two weeks to learn where things are, and just what is wanted of him. When everything is taken into consideration, eighty dollars seems a moderate estimate of the cost of changing an employee."

*Cody: Commercial Tests and How to Use Them. p. 5.

It is obvious that the employee should seek to avoid so enormous a waste of money; it is equally obvious that the employee should welcome any innovation which might place him in the position to which he is best suited, and in which he is, therefore, most capable of earning the best wage in the easiest and happiest manner. The problem, then, is to point out the difficulty involved and devise an effective means of enabling the employer to judiciously place his labor supply.

It is at this juncture that this newest of sciences, psychology, promises to be of material assistance. This science, the progress of which would normally have been slow, has advanced with rapid strides in the last few years, because of the war. Generations of peace could not have taught us as much as the war taught the army psychologists about psychological examinations in four short years. Psychologists found in the army ideal conditions for experimenting with and applying new ideas. Vocational selection, especially, received close attention, since it became necessary in war time to place immediately great numbers of men in different kinds of work. Unscientific and disastrous indeed would it have been to do this blindly. Therefore, all proposals for systematizing the work were accepted and tried, with the result that various types of psychological tests succeeded to an admirable degree. The results of their extensive experiments have become the basis of our present work in Vocational

Selection.

Each of us has within us native tendencies determining our interests and abilities. Mr. Thorndike expresses his opinion, after research, that degree of ability closely correlates with strength of interest, and interest is but another name for instinct viewed from the cognitive aspect, or, let us say, for blends and refinements of instinctive tendencies.* Mr. Watts writes** that instinct and intelligence may well be regarded as respectively the objective and subjective aspects of the same thing. And that considered from the superconscious level, intelligence and intuition are again but different aspects of the same mental process.

In the majority of occupations the principal factor to be considered will be the factor of intelligence. Stern says***, "Intelligence is the general capacity of an individual consciously to adjust his thinking to new requirements: it is general mental adaptability to new problems and conditions of life."

The diversity of ways in which personality may express itself both in bodily movements and in speech are almost infinite. "Intelligence explores all the possible avenues to expression and tends to remain content with those by which it can arrive at the greatest satisfaction. A slum environment or a defective education shuts off auto-

*See Thorndike's article in Popular Science Monthly, 1912.

**Watts: Psychological Problems of Industry, page 77.

***Stern: Psychological Methods of Testing Intelligence.

matically the entrances to many of these avenues, though the strongest personality may often force the barriers."*

There is no doubt that much can be accomplished toward removing the barriers to intelligent selection of occupations by means of vocational guidance offices for boys and girls on leaving school. Leading psychologists are in favor of "pre-vocational training" in the elementary schools. They recommend that special instruction at school, illustrated by lantern slides and so on, in the demands, attractions, dangers, and rewards of the chief available trades and professions be given boys and girls by their fourteenth year, so that they may be better enabled to make their ultimate choice, instead of aimlessly accepting the 'first job that comes along'**. Vocational guidance should also be encouraged during the period of continuation schools, at the works' or outside, due regard being paid to the development of special tastes or capacities after the school-leaving age.

But the scientific application of vocational guidance requires something more than we have outlined. It requires a careful physiological and psychological analysis not only of the requirements of different occupations but also of individual mental and physical differences. For methods of procedure in the latter task we are indebted to the experimental psychology of the laboratory

*Watts: An Introduction to the Psychological Problems of Industry, p. 77.

**C.S. Myers: Mind and Work, p. 89.

where tests were devised for this purpose. In both these ways, the future application of psychological methods and principles to vocational guidance and selection cannot fail to yield results of inestimable value for the advance and well-being of mankind.

Because tests are comparatively in their infancy and because they have often been brought into disrepute by the untrained investigator, it does not follow that they should be looked upon with disfavor. Every science must experience a period of infancy and it is during this incipient stage that it is in danger of being abused by sharpers and fakirs. Every science has its special field and peculiar problems. The chemist before he is in a position to add something of value to his science must understand the major principles underlying that science. He must have an intimate acquaintance with the materials used in his experiments. This most recent science, psychology, also has its special field, a sphere by far more important than the pale of the physical sciences, for it has as its subject matter the human mind. The human mind has an infinite number of variations. It is the purpose of the psychological tests to bring to light the mental variations and powers of each individual.

We now have about thirty distinct tests to bring out the various qualities and idiosyncrasies of the person tested. Among these may be mentioned tests of the accuracy and speed of reasoning, tests of general information, of sensory discrimination, manual dexterity,

mechanical skill, aesthetic appreciation, rate of reading, spelling ability, tests which reveal the subjects' special interests, his accuracy, steadiness, neatness, his memory of names, figures, faces, or facts, the breadth or detail of his observation, his improvability, distractibility, suggestibility, and other kindred qualities. While the mechanical factors are important, they are less vital to the solution of the problem of industrial inefficiency than the factors of a higher type among which intelligence ranks first.

With this type of vocational selection intelligence tests, we have principally to deal. The purpose of this thesis is to provide a guide for those profoundly interested in this important subject; and it has been thought best and most serviceable to collect the thoughts of the major thinkers in this field, and present them in the form of a bibliography. The following classified reviews appear in alphabetical order:

Addams, George S. (Judge of the Juvenile Court, Cleveland, Ohio.)
Defectives in the Juvenile Court.

The Training School Bulletin XI, pages 49-55.

The Honorable George Addams, Judge of the Juvenile Court of Cleveland, Ohio, in a report before the National Conference of Charities and Corrections, makes a strong plea for mental examinations of children in the courts. He emphasizes the importance of mental deficiency in the causation of vice and crime.

A man of such broad experience in this field as Mr. Addams is capable of appreciating the important part that psychological tests can play in detecting the mental levels.

Anderson, John (Yale University)

A Comparison of Two Methods of Giving the Number Series Completion Test.

Journal of Applied Psychology. 4, 1920, pages 346-347.

In this article Mr. Anderson presents a resume of his investigation upon intelligence tests with Yale freshmen in comparison with the cross-out method developed by Mr. Pressey, and the completion method as used in the army of giving Alpha Test Six, the number series completion test.

He explains the construction of the cross-out test and the results statistically computed after allowing an interval of seven months to intervene between the two examinations.

The conclusion derived from evidence from eighty-five students is that the cross-out method of giving the number series completion test is superior to the regular completion method as measured by the criterion of correlation with college standing.

This investigation of the results of different tests upon college students is important because university men are making an honest effort to ascertain the ability and inclination of the young men and women not so much to predict their success in college but in order to be able to give them wise vocational counsel, so that the students

make the best selection of college subjects.

Ayres, Leonard P.

Psychological Tests in Vocational Guidance.

Journal of Educational Psychology, Volume 4, No. 4, April, 1913, pages 232-237.

A good summary of the attempts made to that time, 1913, to apply psychological tests to vocational guidance with the author's hopes for the future.

In the light of recent developments, there is comparatively little of practical value in this article.

Ball, Jan Don (Physician and Psychiatrist, Oakland, California)

The Correlation of Neurology, Psychiatry, Psychology and General Medicine as Scientific Aids to Industrial Efficiency.

American Journal of Insanity, volume 75, No. 4, April, 1919, pages 521-555.

Dr. Ball deploras the widening breach between capital and labor; he endeavors to stimulate a closer relationship between them by the application of scientific and practical selection of employees. It is his belief that each individual should be studied as regards his physical, nervous, and mental fitness for a particular job, that his special abilities and disabilities should be ascertained. He believes that several examinations should be given to the employees and that these should include general medical, neurological, psychiatric, psychological, and social considerations. He gives in detail examples of his methods in giving these various examinations.

Dr. Ball has at the present time the position of psychologist

for the Schell Oil Company, and during the two years that he has held this position there has not been a strike. Moreover, the labor turnover has been reduced from seventeen and one-half percent a month to one and one-half per cent a year. In addition to his personal experience with over 2,000 employees, Dr. Ball has had personal interviews with managers, superintendents, foremen and men in large industrial plants. After careful study of conditions he concludes that the efficiency of every plant is entirely dependent upon the methods used in its employment bureau.

These thoughts coming from a man who is doing intensely practical work in industry and who has been engaged for a long period in psychological research work should be accorded considerable weight. His accomplishment in reducing the labor turnover of a large oil refinery by the use of psychological tests is but one concrete indication of the potency of his ideas on this subject.

Berry, C.S. (University of Michigan)

Value of Psychological Tests in Determining Life Vocations.

Michigan School Masters Club Journal, 1914, pages 88-96.

Professor Berry states that those slight individual variations, which often spell the difference between success and failure are revealed by psychological tests.

There is in our society as much native ability among the children of the poor as among the children of the rich and, therefore, society

suffers a tremendous loss in allowing environmental conditions, instead of inherent ability, to determine the kind of education a child shall receive and the kind of vocation he shall follow.

Our psychological clinics should enlarge their work to include the examination of boys and girls with a view of determining their vocational aptitudes. In this way the psychologists could supplement the work of the vocational counselors.

Professor Berry's statements of 1914 have been verified in a large measure by later writers. (See G.W.A. Lucky's article "The Psychological Clinic in Practice", School and Society, 12, No. 288, July 3, 1920, pages 6-12.) Professor Berry gives no data to support his conclusions; however, his theory is good.

Bonser, Frederick G. (Teachers' College, Columbia University)

The Selective Significance of Reasoning Ability Tests.

Journal of Educational Psychology, April, 1916, volume 7, No. 4, pages 187-200.

Mr. Bonser presents an account of a study of tests in reasoning ability of over seven hundred and fifty children of four, five and six grades of the schools of Passaic, New Jersey. The records of these tests were carefully tabulated and filed. After nine years, a period which would practically insure that all of these children who would complete a high school course had accomplished that end, a study of their scholastic achievements after leaving

grammar school was made. The purpose was to discover whether the distribution and success of the individual pupils indicated any selective significance in the results of the reasoning ability tests.

The correlation between test results in the grades and subsequent school performance, seemed sufficiently positive to lend much encouragement to the hope for easily and quickly applied tests whose results are significant for educational guidance.

The results of tests, devised subsequent to the writing of this article have indicated a certain correlation between the reasoning ability of children in grammar school and their later secondary school performances.

However, the hopes of this author have not as yet been concretely realized. The last year or two have witnessed some extensive experiments in this field by the leading colleges in the United States. Columbia is but one of the major institutions intensely interested in this work. We are not as yet sufficiently removed in point of time to form an accurate estimate of the results obtained.

Breese, E.B.

Vocational Guidance,

Unpopular Review, volume 4, No. 8, Oct-Dec, 1915, pages 345-358.

Mr. Breese discusses the demand made upon psychologists by the 'sob-squad' of social and industrial reformers who are seized with

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hysteria over the waste caused by the round pegs getting into square holes and the square pegs getting into round holes.

He maintains that psychology is unable to furnish a scientific basis for vocational guidance on account of the differentiation in personality. Even though personality be analyzed into its elements, it cannot be determined which of the many possible combinations of them will make for the greatest success in any one calling.

He cleverly pokes fun at Munsterberg's tests for sea captains. He says that the best test that Munsterberg has devised is the telephone operator's test because this test brings out the applicant's skill in memory, attention, general intelligence, space-perceptions, rapidity of movement, and association, the very characteristics which are required in the actual performance of a telephone operator's duties. He states that although the group selected by such tests will do better work than the group rejected, yet there may be many single individuals, in the group rejected, who would make excellent operators. Real vocational guidance must take the point of view of the applicant who wants to know whether he is fitted for the job or not. It is a comparative easy matter to select out of a large group, by means of psychological tests, a few individuals for a given job, but it is quite another matter to select the job for the individual. This latter task is the most important duty of vocational guidance.

Mr. Breese discusses the inadequacy of determining the adolescents abilities and limitations because their abilities, likes and dislikes, ideals and aspirations, powers and capacities are in a state of flux and flow. A year or so later they may show fitness for something entirely different.

He believes that many of the misfits in society are failures not because they are highly specialized and have not found the vocation they are fitted for, but because they are lacking in fibre. They are misfits not because they lack a certain kind of vocational skill, but because they are lazy, or dishonest, or otherwise unreliable. Their difficulty is due to the fact that they have not had sufficient training in right thinking. They have not been taught the proper concepts, and consequently they have not created the right interests in life. Such intellectual and moral shortsightedness is the inevitable outcome of any system of education that attempts to meet only commercial and industrial needs. A system of this kind tends to make merchandise out of human beings, and to ignore the higher qualities which after all are quite as necessary for vocational success as industrial skill.

The danger of vocational guidance, according to Mr. Breese, lies in the fact that it may suggest the wrong kind of special training. It is an educational blunder to attempt to train a child for any specific vocation before he has reached a certain maturity, because such

training will limit his chances for a broader education. The school period should not be one of narrow specialization, but a period of general growth and development in which the foundation is laid for right thinking. In the long run the best preparation for life is that which gives the proper concepts for such thinking. The school should not furnish narrow specialized training but an intellectual and moral background that will serve as a basis upon which he can adjust himself, not only to the matter of earning his bread and butter, but to something besides mere business and industrial efficiency.

An entertaining article! Mr. Breese points out the defects of intelligence tests in relation to Vocational Guidance. At that time, 1915, there were so many pseudo-psychologists who were pretending to a thorough knowledge of a science with whose fundamentals they were unacquainted with that we can but appreciate Mr. Breese's article as a good retaliation. There is no little truth in what he has written. Nevertheless, the reader must bear in mind in his perusal of this article that since these thoughts were expressed by Mr. Breese a tremendous development toward practical psychological tests has taken place as a consequence of the activities of the army psychologists during the World War.

Brietwieser, J.V. (University of California)
Vocational Polymorphism,
Educational Foundations, 32, 1920, pages 281-284.

If psychological tests are developed to the form where they

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really determine a man's fitness for certain occupations and show his relative fitness for others, then society will become fixed or vocationally polymorphic like bees and ants are fixed in their animal occupations at a lower level.

This would happen if the place into which some of the ardent writers on this subject would have the individuals put were rigid and static. Human life can never be confined within molds or fetters and the industrial system which has man's interest at heart will allow space for development. Dr. Breitwieser's article shows that he opposes the placement of individuals into rigid or static places.

Brewer, J.M. (Head of Vocational Guidance Division, Harvard University)
The Aims and Methods of Vocational Guidance,
Educational Review 62, pages 22-33, June, 1921.

Dr. Brewer maintains that a true democracy requires for its workers an education broad enough to enable them to visualize the vocational opportunities open to them and which will render them capable of cooperating as free moral agents in a manner unknown in any form of autocratic organization of government or industry. He believes that it is the task of a democracy to distribute its workers efficiently and economically on the basis of their aptitudes in preference to the arbitrary methods of assignment employed by many paternalistic governments.

The decision which the youth makes in the choice of a vocation has a direct influence upon his civic activities, religious life, and his recreational opportunities.

He calls our attention to the fact that vocational guidance of some sort, either good, bad, or indifferent, is inevitable, and that the present type of advertising, featuring 'get rich quick' appeals, tends to mislead the youth about to choose a vocation. An elimination of this evil may be accomplished by affording to the youth wise vocational guidance.

Mr. Brewer discusses the methods of vocational guidance on the basis of the five steps in the vocational progress of an individual, from his earliest years in school until he has achieved success as a worker: First, gaining broad and useful experiences that will discover and try out one's interest and abilities; second, studying the opportunities and the problems of the occupational world; third, choosing a vocation; fourth, preparing for the occupation; and fifth, securing progressive readjustments and promotions that will obtain a satisfactory vocational status in life, and an American standard of living.

The author approves of psychological tests, for these tests have an important value in enabling those in charge of the work of vocational guidance to become acquainted with the mental powers and

deficiencies of those to whom this guidance is to be given. For, although they do not reveal definite vocational leanings, yet they do reveal the probable general mental level.

Mr. Brewer very effectively portrays the deficiencies of the present scheme of vocational education. The youth in determining his life's vocation too often acts blindly and hastily with the result that too many square pegs are placed in round holes. Careful guidance and counsel should be substituted for the sadly deficient efforts made at present. He points out that the vocational guidance offered under present conditions is too often tainted by prejudice and enfeebled by erroneous knowledge and suggestions.

This very instructive article reveals the inadequacies of our present system. Mr. Brewer is not backward in his indictment of many features of our present day type of vocational guidance. But he is not merely a destructive critic, for as a substitute for the antiquated structure, he seeks to demolish, he offers a constructive program which he believes will eradicate most of the vices enfeebling our present system. This constructive program, as previously described, is in my opinion a valuable contribution toward arousing the need for the application of psychological principles to vocational guidance.

Bridges, James W. and Dollinger, V.M. (Ohio State University)
The Correlation between Interests and Abilities,
Psychological Review, 1920, 27, pages 308-314.

Mr. Bridges and Miss Dollinger present a study in comparing the interests and abilities of students in college. Since no objective method is available for measuring interests, they had several hundred students at the beginning of the semester to arrange their subjects of study according to their interest in them. Next, the students arranged courses of study according to ability. At the end of the semester the grades actually made by each student in the courses were obtained.

Records were obtained from over 500 students and the relationship between interests and abilities was determined by Pearson's formula for mean square contingency. Five tables are given.

The results showed that when ability is measured by college grades, a very low correlation between interest and ability is obtained.

This careful study fails to show a high correlation between interest and ability. However, we must remember that college grades are not infallible measures of ability. Moreover, the students' arrangement of their programs in accordance with their interest may have been in some cases misleading. Further research work in this field is needed before a conclusion can be drawn.

Burt, Harold E. (Ohio State University)

Employment Psychology in the Rubber Industry,

Journal of Applied Psychology, 4, 1920, pages 1-17.

Mr. Burt has spent some time as consulting psychologist of a large Canadian rubber company. The article is a general account of the method used at the tire factory in his research work.

He tells of his preliminary work in getting personally oriented and getting the proper harmonious relations with those in authority. He gave a preliminary series of tests to the executives, to most of the foremen, and to a sampling of the factory workers, in order to familiarize those whose cooperation was needed with the methods.

His general procedure was the standardization of mental and motor tests upon workmen of known vocational ability, in order to use these standards for placement of new applicants to the type of work for which they would be best suited. The operations he classified into three large classes: Those requiring no special mental ability, such as shoveling and trucking; those involving a few simple operations which required a small amount of intelligence; and those involving specialized mental or motor abilities.

He gave thirty-two tests in all covering a rather wide range. The majority of the tests were given by means of mimeographed blanks to groups. Others were given individually with some apparatus. All of the tests were given in two installments. Each installment was

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divided into two equal parts on the basis of time. With these four test measures the first one of the first installment and the other two likewise averaged together. This gave two test measures which could be correlated with the two vocational measures to correct the coefficient of correlation for attenuation.

"The most promising tests were retained, the coefficients corrected for attenuation, partial correlations computed and the regression equation derived in order to weigh the tests and get the best possible prediction of vocational ability".

Mr. Burrtt proceeded with the tests in a strictly scientific manner to get the best possible prediction for vocational ability. One surprising result of the tests was the low correlation of vocational ability with most of the tests involving motor coordination.

The test program in the case of given workers depended largely upon the positions vacant in the factory. It occasionally happened that the recommendations on the basis of the tests ran contrary to an individual's interest. In that case, effort was made to dissuade the man from the work he wished to do.

Practically all men who scored above the average in the tests and were hired on that basis were successful. A number of men with low test scores who were hired as a check on the method gave up the work in a short time, indicating that a lack of success

produced a lack of interest.

Mr. Burt did not remain long enough in the factory to verify the actual accomplishments of the tests. He convinces us that he understands the scientific method of procedure, and his experience with the tests tends to show that they are of value in predicting ability for success in the vocations.

Cattell, J. McKeen (Editor of 'Science')
Practical Psychology,
Science No 53:30-5. January 14, 1921.

Mr. Cattell believes that research work carried on by psychologists will prove of great economic benefit to society. He states that at a cost of about fifty cents each to the army nearly two million recruits of the late war were given psychological tests, and the value of each for purposes of promotion, elimination and selection appears to have been somewhere between ten and one hundred dollars, or a total saving to the nation of one hundred million dollars.

He believes that the economic value of such tests for school systems, for the government service, for industries, in all cases where the individuals are selected for work, for promotion or for special tasks, is equally great. He thinks that we may be able to double the productivity of labor by selecting individuals for the work for which they are best fit, all the way from the moron to the president

of the nation. This will mean a saving of seventy million dollars a year to the country.

Mr. Cattell is most optimistic but his conclusions are based entirely on the work done in the war. He gives us no further statistics, and his article deals mostly with hopes for the future.

Chapman, J. Crosby (Associate Professor of Educational Psychology,
Yale University.)

"Trade Tests"

The Scientific Measurement of Trade Proficiency,
Henry Holt and Company, 1921.

Mr. Chapman explains the development of trade tests in the army and the great benefit derived from their use. He indicates the requisites essential to a test capable of accurately measuring the vocational aptitudes of the men in the United States Army. His summary of methods are:

- (1) The methods must be applicable to all trades.
- (2) The methods must be such that they can be employed by an intelligent examiner who has no personal knowledge of the trade.
- (3) The methods must yield a rating of a man which is independent of the examiners individual judgment, in other words the test must be objective and not subjective.
- (4) The methods must be rapid, and in most cases must not require the use of tools or apparatus.

The author points out that the army test method of trade test is not immediately applicable in its present form to use in industry. He states, however, that the experimental methods which, under favorable conditions, were given such thorough try-out by the army yielded results and devices which either in their present form, or in a slightly adapted form, may be used to advantage in industry.

He explains in detail the development and use of:

- (1) Oral trade test methods
- (2) Picture trade test methods
- (3) Performance trade test methods
- (4) Written trade test methods

He gives us, in detail, tests from the building, electrical, foundry and machinist trades.

Dr. Chapman reminds us that any method of determining trade qualifications is meaningless unless coincident with it there is adequate information concerning trade needs. He states that any analysis of a job can be made from two viewpoints:

- (1) the human qualities and properties for which it calls
- (2) a detailed account of the actual operation and skills characteristic of the job. He deems the second far more useful.

He mentions three distinct characteristics essential to job analysis:

- (1) The physical characteristics of the job
- (2) The mental characteristics of the job
- (3) The economic characteristics of the job.

According to the author's viewpoint, the trade test is not an intelligence test. He explains the use of the various types of trade tests and the adaptation of method to training of employees.

Dr. Chapman believes that the standardized test, with prescribed levels of achievement, is most satisfactory in a specialized office. For general use where it is impossible to control conditions, the Selective Trade Interview is better, since it is more flexible and more adaptable.

He discusses the use of tests by the U.S. Employment Service under the department of labor. He cites some of the special advantages which may be derived from even a limited use of trade tests.

He calls attention to the significant fact that trade tests, as employed in the various camps of the army, established uniform standards of achievement, standards which did not vary with place, time, or examiner.

Dr. Chapman reminds us that we accept the necessity for never changing standards in the realms of physical measurement and that the application of scientific measurement in the field of human skill should be deemed at least as important.

The facts and conclusions set forth in Dr. Chapman's book are of especial significance in that they represent the results of constant and intelligent experimentation, not upon a few individuals, but upon that composite cross-section of American life - the army of the world war.

Clark, J.M.

Economics and Modern Psychology

Journal of Political Economics, Vol. 26, pages 1-30 and
136-166, January and February, 1918.

Mr. Clark believes that it is impossible for the economist to ignore the psychologist, and to keep his studies from duplicating the psychologist's work the economist should not attempt to carry on the psychologist's work himself, but should adapt it from the psychologist. Economists can not keep psychologists out of their work because it is largely concerned with the workings of the human mind.

He states that it is suggestions that mold men's wants and demands and they may be a direct part of the business of earning a living.

The task of self-guidance which modern industry imposes is, according to Mr. Clark, beyond the powers of the unaided individual, and the social need of large scale cooperative guidance is largely beyond the reach of individualistic commercial incentives.

He gives a very detailed outline to indicate what should be studied in determining "Free" Economic Choice. There are two kinds of efficiency, standardized and unstandardized, and this outline will help in the study.

Mr. Clark believes that the value of individual initiative in vocational guidance is so great that a change in any case should

bear a burden of proof.

Mr. Clark presents some sound wisdom in this well-written article. The need for the psychologist is suggested in the admission that the task of self-guidance is largely beyond the powers of the individual. Mr. Clark and the psychologist are in harmony in believing that proof is in order before instituting a change.

Cody, Sherwin (Secretary and Managing Director, Associated Schools
of Scientific Business)
Commercial Tests and How to Use Them
Yonkers-On-Hudson, New York. World Book Company, 1919.

The book presents a discussion of the organization and work of the National Association of Scientific Business. This Association tried out and devised a series of twenty tests which were published in 1915 and 1916, as Bulletins Number 1, 2, 3, and 4.

The principles of Scientific Tests, including the army intelligence tests, are explained. The national tests are described in detail with directions for giving and grading.

Mr. Cody believes that efficiency may be increased, both in business offices and in schools by the use of mental tests. He particularly favors their use in the schools. He states that the fundamental subjects can be handled to give them a true vocational character by measuring speed and accuracy in such a way that employers will award positions partly on the records of such measurement.

The way to accomplish this is to establish standards of measurement and to keep a national employment list of students with their records. He believes that this will be an incentive to students to do better work in school and an opportunity to students to more readily receive employment.

He discusses the cost of the labor turnover and states that a general use of standard measurements for office employees alone would save thousands of dollars to employers.

Not only would money be saved, but in addition employees would be encouraged to prepare themselves for higher positions. The substitution of definite conditions for promotion for vague promises will banish suspicions of favoritism and induce employees to strive for advancement.

Mr. Cody emphasizes the benefits that may accrue from the use of tests, especially in the schools. His book presents some good reasons for the use of tests. He fails to give us concrete facts of what has actually been accomplished by their use, other than recounting the war experience.

Colvin, Stephen S. (Brown University, Providence, R.I.)
Psychological Tests at Brown University 10:27-30, July 5, 1919.

Mr. Colvin tells of the giving of a series of tests to the men in Brown University at intervals of several months duration. The

preliminary results showed that these tests would probably be of value in determining scholastic ability and success in college of the students examined.

After the marks of the first term had been recorded, correlations were made between these and the various psychological tests. Likewise, correlations were obtained between the tests and marks of the second term. Also, between these and the average mark of the first and second terms combined. He gives a table to show correlations.

The results of these tests proved so satisfactory that they are being continued and extended at Brown University. Each entering student will be given the Columbia Comprehensive Tests and his admission to college largely determined by his degree of success or failure in passing them. By evidence furnished through these and other tests and by additional information secured from other sources, it is planned to aid students in selecting their subjects of study and in choosing their life vocations.

Mr. Colvin's theory of assistance is good, and his preliminary work scientifically planned. We cannot at this early date predict success for the methods involved. More concrete results are needed.

Crathorne, A.R. (University of Illinois)

Change of Mind Between High School and College as to Life Work,
School and Society, Volume XI, January 3, 1930, pages 28-30.

The article contains a summary of the more important results of the investigation by the National Committee on Mathematical Requirements on the change of mind as to life work of boys and girls between entrance to high school and entrance to college.

Two thousand college freshmen were studied by means of questionnaires which they answered. It was found that on entering high school fifty-seven percent of these students had decided upon a life work. Before entering college, exactly fifty percent of these fifty-seven percent had changed their minds. There was very little variation for sex.

This investigation is pertinent for the purposes of vocational guidance. It tends to show that special aptitudes for just one occupation are very rare and that most persons, so far as capacity is concerned, could pursue any one of several different occupations with practically equal chances of success.

Dickson, Virgil E. (Director, Bureau of Research and Guidance, Berkeley)

Mental Tests and the High School

The Sierra News, October, 1920, pages 481-483.

I have thought it best to quote the author's own words:

"The level of intelligence is probably the most important single

factor in determining the placement or guidance of any individual..."

"Up to a certain level the controlling factor for many vocations and responsibilities in life is undoubtedly mental capacity."

Dr. Dickson's long experience in guidance enables him to estimate the value of the levels of intelligence, as determined by psychological tests, in vocational selection.

Fisher, Boyd

"Has Mental Hygiene a Practical Use in Industry?"
Mental Hygiene, July, 1921, pages 479-498.

Mr. Fisher informs us that in the clothing trade in Baltimore the unions themselves recently consented to a grading of workers according to ability, and approved a plan of varying rates of compensation in each grade. Armour and Company, the Westinghouse Companies, the General Electric Company and Sears Roebuck are among the well-known concerns who rate their workers according to intelligence and other qualities as a basis for assignment and promotion. Nearly every modern employment department has made or is making a set of job specifications. Not only the physical strength and skill, but also the degree of mental capacity is usually prescribed. He thinks it is wasteful to put a man on a job for which he is not competent or to squander a brilliant worker upon a job beneath his qualities. Mr. Fisher states that industrial managers have learned

that some jobs thrive in the hands of the morons. He cites monotonous inspection work in certain button factories as an example. Even if morons do not lower the efficiency of operation, he believes it is nevertheless valuable to "tag" them, if only to spare us the trouble of trying to force them beyond their capacity.

It is interesting to learn that so many large concerns are finding the use of psychological methods as a basis for assignment and promotion of value to them. However, Mr. Fisher makes only statements. He gives us no definite information of the actual workings of the plan.

Frost, Elliott (Rochester, New York.)

What Industry Wants and Does Not Want from the Psychologist
Journal of Applied Psychology, 1920, Number 4, pages 18-25.

Mr. Frost mentions that the needs of industry are great and that she is worthy of such help, as she needs. He names thirty-three specific needs among which are Psychological tests and Vocational Guidance.

He states that making money is the expectation of business and that the annual economic loss in this country from labor turnover is estimated at one and one-half billion dollars. Fifty percent of the turnover is caused from discharge occasioned by: Inadaptability, Unwillingness to work, Wrong Attitudes toward work or Positive Mis-

conduct. The other fifty percent is due to dissatisfaction.

Mr. Elliott believes that psychology can help the employment manager in his hiring and firing and making of transfers within the plant, if it can devise a simple readily-applied test to determine (a) Intelligence, (b) Adaptability to Particular Tasks, and (c) Temperament. In this connection it is well to remember two facts: First, that labor is usually either very abundant or abnormally scarce. If abundant, rough empirical tests with recommendations do very well. If scarce, the man will be taken on anyhow, whatever his mental rating; Second, we need to remember that vocational training does not place a man. Mr. Frost believes that it is the Law of Supply and Demand and not his ambitions or aptitudes which determines the career of most men in industry.

Mr. Frost advises us that industry does not want a booklet of psychological tests; that the advertised success of the latter in the army camps has not sold the ideas to the manufacturers; that the manufacturer must be shown the value of any technique by patient education and proved results. Not theories but concrete results are needed.

He deplores the tendency toward depersonalization and mechanization and says that industry needs a new vision of the importance of psychology itself more than analysis, teaching of aliens, train-

ing of foremen, or tests.

This paper which was read at the annual meeting of the American Psychological Association in 1919 is in my opinion very apropos. In any new movement, enthusiasts will tend to make claims that are somewhat unsupported by facts. Mr. Frost states that not theories but concrete results are needed.

Gerhardt, P.W. (Superintendent, Transportation, Dallas Street Railway)
Psychological Tests for Workmen
Industrial Management, Volume 51, pages 605-607.

Mr. P.W. Gerhardt states that by using psychological tests upon motormen they increased the length of time of employment for motormen seventy percent. He estimates that the hiring and training of each man costs between twenty-five and seventy-five dollars and he makes clear that the saving in this item alone is considerable.

These tests, according to Mr. Gerhardt, enable his company to select from applicants for positions those men who are best fitted for the job. His survey shows that this intelligent selection of employees, made possible by the application of such tests as his company uses, contributes directly to the lessening of accidents. Such a salutary condition cannot but increase the good will of the patrons of the street car system.

The author, whose position as superintendent of an extensive traction system enables them to closely observe the actual practical workings of these psychological tests given to over 1,500 employees, makes a valuable contribution in support of the importance of psychological tests for vocational selection.

Goddard, H.H.

Human Efficiency and Levels of Intelligence
Princeton University Press, 1920.

Mr. Goddard makes it clear in this well-written article that the greatest cause of the present inefficiency and unrest in the industrial world is due to the fact that men have different intelligence levels and to the lack of the application of this truth in industry.

He feels that since our army experience of mental tests, we must admit the fact that every human being reaches at some time a level of intelligence beyond which he never goes; these levels range from the lowest or idiotic to the highest level of genius.

While intelligence or mental level is not the only factor in human efficiency, it is the determining factor. "Intelligence is a matter of brain cells and neuron patterns, and still more definitely, it is a question of the development of the larger asso-

ciation areas of the brain, the functioning of which develops relatively late, and hence this development is particularly liable to arrest; moreover, when such arrest has taken place, there is no evidence that it ever starts up again." Our social inefficiency is due primarily to the large percentage of low intelligence and secondarily to a lack of appreciation of this large number of persons of low intelligence by persons of higher intelligence.

Mr. Goddard believes that it is unjust to the group of low intelligence to attribute their failures to maliciousness or to lack of opportunity. We should appreciate that they are doing the best they can with their limited intelligence and eliminate them from the group of self-directing efficient people. They should be placed in an environment where they can use such intelligence as they possess and where they can be at all times under the care and oversight of intelligent people.

Not only will this group of people of low intelligence be happier and more efficient when they are provided for in the environment created for them, but the total efficiency of society will be increased.

The efficiency of the human group is not so much a question of numbers of persons of high and low intelligence as it is whether each grade of intelligence is assigned a part in the whole organization

that is within its capacity.

Mr. Goddard suggests that we emulate the social organization of the bee more and its supposed industry less. The bee actually works twenty minutes a day. The great amount of work he accomplishes is due to the perfect organization of the hive.

This well-written book causes us to consider the beneficent results which might ensue from the application of its principles to society. The author's ideas are original, there is substantial wisdom in the methods he proposes, and the reader will not regret the time spent in examining his thoughts.

Greenwood, G.W. (Secretary, United Simple Refractories Company)
Simple Tests for Office Applicants,
Industrial Magazine, May, 1919, pages 377-378.

Mr. Greenwood states that welfare work should be concerned in finding what line of activities each one most enjoys, and so far as possible assigning him to that line.

He believes that it is possible to ascertain by tests for what work one is not especially fitted. His plan for finding out who would not be successful is given. This method consists in giving four tests which he outlines. He believes that applying these tests to ascertain who is not fitted for the job is better than "going at it blindly".

This man who is concerned in employing men admits that there is something in tests. No data are given.

Haines, Thomas H. (Ohio State University, Columbus, Ohio)
Detecting the Feeble-Minded in a City School Population
Journal of Educational Psychology, 1919, 10, pages 501-508.

Mr. Haines presents a report of the examination work of over 18,000 school children of Ohio. This work was undertaken for the Board of Education of Columbus, Ohio by the Ohio Bureau of Juvenile Research.

Examination was conducted by the Yerkes-Bridges Point Scale method and a year scale. One hundred and fifty-seven children out of the 18,223, enrolled, or eight and six-tenths per cent, were reported feeble-minded.

The results of examinations are carefully tabulated (tables 1, 2, 3, 4, pages 503, 505, 506, and 507. The intelligence examinations are an important means of separating the feeble-minded from those who are competent but the moral attitudes, educational, vocational and social facts must be considered in all doubtful cases.

Mr. Haines emphatically believes that these non-potential citizens in the public schools are a positive waste of social substance.

Since educational work must be adapted to the needs of the individual, it follows that an intelligence survey may not be omitted;

because it affords indispensable information for the intelligent planning of the education or preparation for citizenship of all the students.

This article illustrates the application of psychology to schools by the use of the intelligence tests. The data on intelligence measuring will furnish useful information to any school that is seeking to understand why some children cannot be interested in nor receive benefit from their school work. It is valuable in that it accents the importance of correct classification of students.

Hall, G. Stanley and Geissler, L.R. (Editors, Journal of Applied Psychology)
Psychology in New Jersey State Prison
(Notes) Journal of Applied Psychology, 4, 1920, pages 112-114.

"The present program of psychological examining at the New Jersey State Prison includes an attempt to introduce scientific management in the problems of industrial and vocational assignments of prisoners."

To accomplish this the psychological section of the Psychiatric Clinic has instituted a psychological and industrial analysis of the Prison activities both vocational and industrial. This analysis is intended to form the basis of intelligent assignment of men to shops or tasks. The regular work of the Psychologist calls for in-

dividual analysis of each prisoner with respect to his general intelligence, mental responsibility, vocational aptitudes, and industrial qualifications. It is the hope of the Department to affect the coordination of this man-analysis and job-analysis in such a way that, knowing the capabilities of the man and the requirements of the job, the welfare of the prisoners and their efficiency in tasks may be materially advanced.

The assistant psychologist, aided by a graduate student in psychology, has conducted psychological and vocational analyses of numerous 'jobs' in the Prison. The results show that the print shop, for example, is a highly specialized industry, calling for particular degrees of skill which are ordinarily attained only after long practice. The print shop also presents an industry whose various operations are highly differentiated with respect to the gradation of processes in the industry. The Psychologist, therefore, has found very clear dependence of success upon general intelligence and general education in the succession of tasks in the print shop. In addition, it is possible in the print shop to measure the degree of specific aptitude and skill which men must possess for immediate success in the work of the shop. It is easily possible to apply mental tests such as alphabet sorting and visual dis-

crimination, and tests of special forms of fatigue which would be applicable to the assignment of men to work in the print shop".

After the individual analysis of the man and the shop analysis, it will be possible, knowing the requirements of the job and the capabilities of the man, to assign a man to a job on a scientific basis. This work so recently installed in the Prison cannot as yet give data of concrete results but some progress is actually being made. The assigning officer at the Prison is already using the results of the psychological examining in such a way as to enable him to place men more successfully than heretofore.

This program seems to me a good one for increasing efficiency and well-being of the workers.

Henmon, V.A.C. (University of Wisconsin)

Air Service Tests of Aptitude for Flying

Journal of Applied Psychology, volume 3, 1919, pages 103-109

This article presents chiefly a review of the work done by the psychologists in the Air Service during the war.

The result was that in spite of the Examining Boards and Physical Examining Units which eliminated fifty to sixty percent of applicants, and in spite of Ground Schools, which eliminated fifteen percent of the survivors, there were at least six percent of men who reached Flying Fields who were discharged or transferred because

of inaptitude for flying. The report of the Director of Military Aeronautics for the period ending June 30, 1919 showed that at that time 4,980 men had been commissioned and about 400 had been dropped for inability to fly.

Over and above the six percent who failed completely, there are a considerable number who, while ultimately commissioned, have no aptitude for flying, learn with difficulty and smash ships. Taking into consideration that the total cost of flying training is \$2.00 per minute in the air, and the enormous cost of wrecked ships, it is easy to see the need for improvement in the methods of selecting flyers.

Psychologists tried out a number of tests in order to select those which would prove reliable for the selection of Flyers. They tried out ten following tests for measuring.

1. Emotional Stability
2. Perception of Tilt
3. Swaying
4. Visual Reaction
5. Auditory Reaction
6. Equilibrium Reaction
7. Equilibrium Differential
8. Extension of Curves
9. Thorndike's Mental Alertness Test
10. Athletic Achievement and Interest.

The correlations of the individual tests with Flying Ability were worked out from experiments conducted at Kelly Field and data are given. The results show that the best tests are emotional stability, especially the hand response, perception of tilt, and mental alertness. The results of these and other experiments lead to the conclusion that tests for determining aptitude for flying are practical.

This article is an interesting account of the work of the psychologists in the field of aviation during the war. It is a valuable contribution for it emphasizes the importance of using psychology to select men for the vocation of flying that human life may be conserved.

Hill, David S. (President of the University of New Mexico)
Introduction to Vocational Education
New York. The MacMillan Company, 1920
Chapter XIII, pages 420-448.
Applications of Psychology to Instruction and Industry.

Mr. Hill presents an interesting sketch in regard to the use of the application of psychology to industry, business and education. He discusses the nature of psychology, its early expectations and present status. He refers to it as a branch of a pure science which is only in its beginning. He issues a word of warning upon the importance of discriminating between the fraudulent practices in the

name of psychology by phrenologists and other charlatans and the scientific work carried on by men and women enrolled in the American Psychological Association, or under the National Council of Research.

He analyzes general intelligence and discusses the problem of measuring abilities and traits in the schools, in the army, and in industry, by a more scientific procedure than guesswork. He refers to the recent experiments in this field of utilizing tests of intelligence and rating scales.

He believes that applied psychology has value in conserving mental health, and in the saving of time in the learning process. He states that a skillful presentation in conferences and readings of the essential principles of abnormal psychology might help personnel and vocational experts to detect points of undiscovered capacity as a basis for occupational training, as well as serious defects interfering with any proposed vocational training or job.

Mr. Hill's article tends to show that he believes psychology may have an important place both in education and in industry.

Hilliard, Edmund B. (Superintendent, Berkshire Industrial Farm, Canaan, New York.)

The Importance of Physical and Mental Examinations as an Aid to Treatment and Training in a Reform Institution
The Journal of Delinquency, March, 1921.

Mr. Hilliard makes clear that a complete diagnosis of reform school children has a great practical value. He states that while medical and surgical treatment for bodily ailments such as defects

of eyes, ears, throat, nose, stooped shoulders, spinal curvature, and the like, are first attended to, yet their bearing upon the neurological, psychological, and sociological conditions of the case is the important and instructive thing.

An expert psychologist can tell whether an individual is feeble-minded or of border line deficiency and of unstable nature and whether his manual or mental work should be stressed. This saves wasted effort of patience and discipline in seeking to accomplish the impossible and at the same time enables the teacher to apply the right kind of training.

This article coming from a man of large practical experience in dealing with children shows a very important work that psychology can accomplish in enabling the teacher to apply the right kind of training.

Hollingworth, H.L. (Associate Professor of Psychology, Columbia University.)

Vocational Psychology

H.L. Appleton and Company, 1920.

The book deals with the individual differences in mental levels and their relation to the vocations best suited to the individual or most helpful to the employer in selecting workers from a group of applicants.

Mr. Hollingworth traces the development of mental tests from primitive magic to the uniform principles of technique, record and treatment of measures which are now used. He points out the special purpose of mental tests and some benefits that society may derive from their proper use. He gives a report of detailed examinations of mental characteristics of successful men made by Dr. Edouard Toulcuse of France who made a careful survey of the mental traits of Zola, the novelist and Poincaire, the mathematician. In each case a study of the heredity development, physical condition, sensory acuity, various kinds of memory, attention, imagery, reaction time, association of ideas, language ability, handwriting, character, habits, and opinions on various subjects were stated.

He reviews the use of the psychograph, the graded scales of intelligence tests, self-analysis in their relation to vocational effort. He discusses the five main occupational groups in regard to the present results of vocational psychology and the determinants of aptitudes. His conclusion is that the program of this new science, together with the definite and positive contributions already yielded, has truly placed the twentieth century as beginning to realize the increase in our knowledge of human nature and in our power to use it for our welfare.

Mr. Hollingworth traces historically the general conception

of vocational psychology and states the present tendencies. The book is a good statement of the psychologists' point of view.

Hollingworth, L.S.

Vocational Aptitudes of Women

Hollingworth's Vocational Psychology, Chapter X.

Miss Hollingworth points out, in an able manner, that there is no considerable differences in average mental ability caused per se; no sex differences, in mental traits which would imply a division of labor on psychological grounds.

Hollingworth and Poffenberger

H.L. Hollingworth (Associate Professor of Psychology, Columbia University)

A.T. Poffenberger (Instructor in Psychology, Columbia University.)
Applied Psychology,
Appleton and Company, 1919.

Mr. Hollingworth and Mr. Poffenberger consider the field of applied psychology to be every situation in which human behavior is involved and where economy of human energy is of practical importance. The book deals in a general discussion of the aims, the various fields of endeavor, the methods and the accomplishments of applied psychology. The significance of the economy of human energy to the vocations is stressed in the discussion of the application of psychology to human behavior. The

authors recognize that psychology is limited to the determination of means, but the determination of ends and their values is beyond its sphere. It is stated in the preface that psychology has been recognized as a vocation under the civil service regulations. Applied psychologists are called to work in factories, schools, courts, hospitals, agencies, banks, employment departments and various branches of municipal and civic enterprise.

The authors recognize that the field of applied psychology is vague and unorganized, yet they believe that applied psychology will be used more and more to solve social and industrial problems.

Mr. Hollingworth and Mr. Poffenberger believe that one of the greatest contributions of psychology to society may be found in eliminating the human and economic waste of the labor turnover. They feel confident that this may be accomplished by the selection of the employees through a more adequate vocational diagnosis of their general mental capacity or their special aptitudes. Incentives and rewards, competent instruction and training, and the provision of the most effective environmental conditions may not be disregarded for they play a most important part in keeping the worker contented and satisfied with his job.

The authors advocate psychological tests as aids in making proper selection, and mention the work done in this field by

Thorndike, Scott, Munsterberg, and others. They suggest that in the application of any science to the concrete purposes of practical life various institutional adjustments are necessary. They predict that the immediate future of applied psychology will be similar to that of applied chemistry and bacteriology, by bearing and integral and universal part of our individual industrial social lives. Later the consulting psychologist will be indispensable.

Summarizing, then, the book defines the scope of applied psychology, narrates its history and gives a general evaluation of its potentialities to society and attempts a prediction of its future.

The authors give a good description of the cultural application of psychological knowledge from the psychologist's viewpoint.

Hubbell, N.D.

How to Select Employees

From the Book - More Work Per Man (Van Deventer)

New York. The Engineering Magazine Company, 1921.

Mr. Hubbell states that there is much in 'Science of Character Analysis' by the observation method, but more scientific basis for selecting employees is rapidly being evolved in the scientific laboratory tests now being worked out.

Although few employment men will have the time to go into the exhaustive studies necessary to work out the tests basing them upon the law of averages, a study of the tests and methods will show some that can be adapted to the individual plant and also suggest other simple tests which will locate fairly accurately what qualifications are involved, and rate the applicant on these qualifications.

Good theoretical ideas.

Jaques, Margaret

Mental Tests for Typists and Stenographers

Industrial Management, August, 1919

Volume 58, number 2, pages 145-147.

Miss Jaques states that the following companies have used mental tests with success in selecting employees: The Charles William Stores, for typists; the Dallas Street Railway, for motor-men; the Comfort Publishing Company and the Metropolitan Life Company, for clerical workers; and the Arco Paint Company and the American Tobacco Company, for salesmen.

She names and explains the four tests used for typists, and the method of giving them as practiced in the Chas. William Company. Thirty-eight typists who had been in the entry division for at least six months were given the tests. An accurate record of each girl's output for the previous six months showed her typing ability.

According to the chart, those girls who could type the most sheets - 500 to 735 per day - were also the ones who made the best test records.

The results of the tests showed that in a few minutes testing they could usually pick out the very good girl and the very poor girl, but it was difficult to discriminate among the average workers.

These facts tend to show that psychological tests are already proving of benefit to industry in the employing of typists and stenographers.

Kelley, Truman L. (Stanford University)
Principles Underlying the Classification of Men
Journal of Applied Psychology, Volume III, 1919,
pages 50-76.

Mr. Kelley presents some of the principles underlying war procedure which were developed or strengthened by his experience in the War Department. His discussion has special reference to the selection of officer material from Students' Army Training Corps. The principles of selection underlying this procedure are equally applicable to peace conditions.

In addition to securing general officer material, it was contemplated that a considerable number of specialists, bacteriologists, chemists, ordnance experts and so on, would be drawn from the Students' Army Training Corps; also, that thirty or forty thousand men fitted for training in schools turning out non-commis-

sioned officers would be found and that those remaining after these selections would be assigned as privates to regular line units.

Dr. Thorndike was called upon to solve this situation. He drew up a scheme which aimed to do the following things:

1. Pick specialists
2. Divide the soldiers into three parts upon the basis of general merit as officer material, the upper part going to officers' training schools, the middle part to non-commissioned officers' schools, and the least meritorious part to camps, continuing upon the status of privates.
3. To do away with the necessity of each corps conducting a separate recruiting campaign.
4. To reduce to a minimum the tendency to exercise personal bias.
5. To be just to the soldiers, both from the standpoint of their abilities and from that of their interests.
6. To determine scores for each man selected for officer material indicative of his respective degrees of fitness for the different branches of the army.
7. To lead to an allotment of officer material to the different branches which both in number and quality would be appropriate to their needs.

The solution to the problem involved determining the closest

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synthesis between the abilities of men, the special needs of different branches of the service, and the numbers required in the branches.

First, the men were selected who possessed the special training necessary to fill a specialist job because it was relatively easy. Next, the remainder of the soldiers were divided into three groups, and their classification for different branches determined by their ratings in the following qualities:

1. Intellect, including academic studies
2. Character
3. Military studies and practice
4. Physique and athletics
5. Command of men
6. Athletic-mechanical ability
7. Scrupulousness

These ratings were made by a Rating Board who were guided by uniform principles. "Accurate classification depends upon the securing of such measures of fitness, before the men have been called upon to demonstrate their fitness by actual performance, as will correlate highly with the excellence of the later performance. The only method of proving that the classification is accurate is by finding a high degree of correlation, between the

diagnostic measure and the measure of performance."

Dr. Kelley explains in detail the facts of correlation or partial correlation because they furnish the key for judging the value of a test when the measures of demonstrated fitness are not available.

The attempt to estimate and interpret all the relationships relevant to partial correlation is particularly serviceable in suggesting measures which may be expected to prove valuable, since a method involving proof is not yet available.

The method of determining which of the several jobs the man will best fit is presented. The discovery of the 'best place' for an individual is, in Mr. Kelley's opinion, an obligation for the psychologist to solve.

Mr. Kelley gives a full description of the Analysis of Capacity and concludes that general intelligence is only approximately synonymous with initiative and originality in selecting appropriate trade habits, and with ability to learn new tasks. The other factors may be expected to be the ones which correlate so highly (.875) with vocational selection.

A well-written article. Its study will be worth while to one interested in this field.

Kelly, Roy W. (Employment Manager for Poos Brothers, San Francisco, California and formerly Director of the Bureau of Vocational Guidance Division of Education, Harvard University)

Hiring the Worker

Engineering Magazine Company, 1918.

Mr. Kelly tells us of the work of the Vocation Bureau in Boston in establishing an organization of employment executives, and the results of the association. The purpose of the association was to study the human problem in industry. The members, and all other thinking people, in my opinion, agree that in no other phase of management as in the current practice of hiring, handling and discharging employees are there so much unintelligence, recklessness of cost, and lack of imagination. On the other hand, in the right organization of the employment scheme there would be possibilities of genuine service that would exceed that of the most benevolent of welfare projects.

The solution Mr. Kelly presents to the problem is that of recognizing a new profession in the organization of industry - the profession of hiring and developing men. Mr. Kelly advocates the establishment of a definite training course on a professional basis for the work of handling men. He names the Tuck School at Dartmouth College, and the Wharton School of the University of Pennsylvania as two examples of institutions of business training that provide employment courses as subjects for instruction. He believes that

unique opportunities are ahead for cooperation between the forces that make industry possible.

The author presents data secured from employment managers, superintendents and others concerning the employment methods in forty-six firms, representing a total of 66,000 employees. The summary shows the need of job analysis and highly organized employment department to reduce labor turnover.

Mr. Kelly gives samples of specifications in job analysis as worked out by Mr. Meyer Bloomfield of the Vocation Bureau of Boston in the firm of Rumberger and Company of Newark, New Jersey for their personnel work. Mr. Bloomfield furnished the employment department with definite data about actual needs and requirements in every opening to be filled, and they had available for their employers details and suggestions about the work of the various openings.

The author states that no one has yet been successful in formulating a method that is susceptible to scientific proof or that can be effectively practiced by others. He believes that applied psychology may, in time, prove a hopeful solution. He calls attention to the growing interest in the vocational guidance movement and the willingness of open-minded executives to cooperate in any movement that promises a solution which will be fair to both the employer and the workman.

His work is a discussion of the labor turnover problem, with helpful suggestions of how to cope with it through the specially qualified employment manager. Mr. Kelly presents some interesting information in regard to the need for a scientific method of hiring and promoting employees. His wide experience in this field enables him to make some wise suggestions. His theories are of sane and helpful significance.

Kemble, William Fritz,

Choosing Employees by Mental and Physical Tests
Industrial Management, January, 1917, pages 447-460; also
The Engineering Magazine, 1917.

Mr. Kemble presents a thorough discussion of various methods for analyzing, testing, and sorting employees. He is engaged in introducing systems for standardizing the general working forces of commercial and manufacturing concerns.

He tells us that Mr. Bruce with Professor Walter Dill Scott, originated a testing system for salesmen which has been tried out in the American Tobacco Company and that the results showed a success about three times as great as that attained by former methods.

Mr. Kemble states that by the system introduced in the Curtis Publishing Company the stenographers are producing twenty-nine words a minute as against the former fourteen, the girls receive twelve

dollars a week instead of eight dollards paid them formerly.

He gives us examples of tests for right and left hand, finger speed, and for ambidexterity. He explains the ergograph for testing fatigue, the dynamometer for testing strength of grip. He illustrates hand measures with table of averages, and outlines a logical basis for calculating and weighing tests.

Mr. Kemble's article gives us the result of his careful and painstaking experiments. He says that he has not as yet secured any reliable data. However, the accomplishments already recorded by the stenographers tend to show that tests are proving of practical assistance in that field.

Lamb, J.P. (Employment Manager with Cheney Brothers, South Manchester, Connecticut.)

Intelligence Tests in Industry

Industrial Management, July, 1919, pages 21-24.

Mr. Lamb who has had twenty-two years of experience with manufacturing concerns, believes that an intelligence test is only an aid to judgment. It does not furnish information concerning qualities such as honesty, loyalty, industry, reliability, or the emotional traits. It does furnish a fairly trustworthy index to general information, imagination, ability to understand and follow directions, mathematical ability, ingenuity, power of analysis, accuracy, carefulness, reasoning ability, ability to learn, and mental alertness.

He states that he knows of no other method yet devised that, in practicality of procedure and evidence obtained, equals this method of gaging general intelligence. The use of tests, together with other sources of information, should, in his opinion, create better judgments in the selection and placement of employees.

He believes that the occupational specifications and the approximate intelligence rating necessary to each occupation should be established.

He gives in detail the tests that have been used in the plant which employs 5,000 persons. The average rating of applicants was fifty-eight percent in accuracy. The average rating of applicants employed was seventy percent.

This article coming from an employment manager tends to show that tests are coming up for important consideration in the industrial world.

Link, Henry C.

Employment Psychology

The MacMillan Company, 1919

The Application of Scientific Methods to the Selection, Training and Grading of Employees.

Dr. Link defines employment psychology and shows that although trade and intelligence tests were of great value in classifying the army, yet before these tests can be applied to a particular industry

they must be carefully and scientifically tried out and modified to meet its specific demands.

He analyzes the experiments that he worked out in discovering a set of mental tests which could be used by the employment office in selecting applicants for certain kinds of work. He tried out a test on two thousand nine hundred persons and his results showed that the personal judgments of the experimenter, foremen, and instructors were not nearly so reliable as the evidence of the tests. Dr. Link describes his portable laboratory. He explains in detail the testing of inspectors, assemblers of cartridge shells, machinists, clerks, stenographers, typists, comptometrists, machine-operators, draftsmen, tool makers, and tool-maker apprentices.

Dr. Link endeavors to bring out by means of a dialogue that there is no such thing as general intelligence and that if there were, it would be of little use to employers because they are interested in specific abilities or kinds of intelligence and not in general abilities.

He gives simple illustrations of popular tests and explains the technique of giving tests. He discusses the vocational value of tests and points out that many useless and costly vocational experiments can be eliminated by their application and successful ones made possible instead, thus promoting the welfare of the individual

worker and the interests of the organization. He discusses at some length trade tests and other applications of psychology. He says that trade tests are a subdivision of psychological tests.

Dr. Link describes the use of the "vestibule school" and the factors of selection and retention. He makes clear that the aim of employment psychology is to attain the viewpoint of the applicant and to further his interests by selecting him for the work which he is best able to do and at which he will be of greatest value to society and to himself.

Dr. Link feels the most urgent need of mental tests, in order to get the right man into the right job and thus prevent the large labor turnover which, according to his viewpoint, is the greatest evil in industry.

This book presents an account of the use of psychological tests under working conditions in a wide range of factory and clerical operations with rather simple statistical treatment. The book would have been much more worth-while had it dealt with fewer operations and more use of correlations. However, Dr. Link probably had in mind a program of propaganda, and for that purpose, the book has a place

Lucky, G...A.

The Psychological Clinic in Practice

School and Society, 12, No. 288, July 3, 1920, pages 6-12.

Mr. Lucky mentions the valuable work Alfred Binet has done in devising a method for measuring the mental capacity, common sense, native ability and general intelligence of individuals, especially during the years of childhood and adolescence. One of its values is in the arousing of educators and thoughtful pupil to the deplorable method of the lockstep system and the need for reform.

He states that the use of the intelligence scale has already proved of great value to the intelligent teachers in adapting the school work to the development needs, and capacity of the child during the most plastic years. He believes the field to be even larger in the social and industrial life, especially in its possibilities in measuring intellectual ability, selecting the right man for the right place, and in determining the occupation best suited for the type of mind represented.

He reviews the results of the intelligence tests and mental rating of 36,500 recruits, of the U.S. Army, who were rated according to mental ability but classified according to occupations. He gives the mental ratings of the men classified according to occupations on a scale of 100. The lowest were laborers, the highest engineers. Mr. Luckey states that it was this psychological testing and intelli-

gent selection of the right man for the right place which developed the new, raw recruits so quickly into such an efficient army.

He concludes from this and other studies that the different occupations in which men serve require different degrees of mental ability in order to reach the highest efficiency.

He calls attention to the necessity for the psychological clinic in the care of the subnormals of the feeble-minded class. It is important that they be segregated in order to protect society from increasing moral degeneracy. This three percent of society furnishes forty percent of the delinquents and criminals. Under wise and sympathetic supervision and complete segregation during the period of procreation they may become self-supporting citizens without injury to society and without burdening future generations with more of their kind.

He gives a few typical cases brought to the clinic and shows how they were satisfactorily dealt with.

This article presents to my mind a very forcible argument in favor of psychological tests for vocational selection. The assistance of the clinic enabled the teachers to place the children where they belonged in school. Mr. Luckey gives interesting examples of the results of replacement of two super-intelligent children in school.

It is agreed among most educators that the schools have not tended to the best development of the brilliant child. And it is obvious that the correct placement of the brilliant child and the subnormal child in school will be a most important step in vocational selection.

Madsen, I.N. (University of Omaha)

The Army Intelligence Test as a Means of Prognosis in High School
School and Society, No. 11, 1920, pages 625-628.

Mr. Madsen submits in this article data showing the possibilities of using the Army Intelligence Test or similar group tests as a means of prognosis in high school. In three high schools in Omaha 2,530 students were studied. Four tables are given, showing respectively (a) median scores in Army Alpha Test, (b) sex-differences in tests, one to eight, Army Alpha Test, (c) comparison of median South scores in school marks and intelligence in the/Omaha High School, (d) correlation of intelligence with school marks in the South Omaha High School. The tabulation shows (1) that the schools rank in order of the percent of the students having parents of American nativity. The hereditary influences account for those of the American ancestry ranking first; (2) the boys made a higher median score than the girls in the alpha tests, although the girls have higher median school marks than the boys. Mr. Madsen explains that this is not inconsistent because certain emotional traits resulting in greater stabil-

ity and docility enable the girls to secure better school marks on a smaller mental capital than the boys need. (3) Table IV shows that the correlation of intelligence with school marks is decisive. Pearson's coefficient of correlation formula was used and the result showed that the correlations are all positive and all large enough to be significant.

To determine whether there would be any difference in subjects chosen by the students scoring high and those scoring low in the army test, the students scoring above the upper quartile and below the lower quartile were compared. The results showed that there was a marked tendency for the superior group both in the freshmen class and in the three upper classes to select the subjects usually considered "hard" and for the lower or inferior group to select vocational or pre-vocational subjects. Mr. Madsen states that this tendency is prevented from full expression by certain fixed requirements and by lack of "sophistication" among the students, and that it thus seems that intelligence testing points a practical way of vocational guidance and prognosis in high school.

Mr. Madsen's article is a valuable contribution in favor of the use of intelligence tests in vocational guidance because the investigation was scientifically conducted and data are given.

Minor, James Burt (Carnegie Institute of Technology)
Standardizing Tests for Vocational Guidance
School and Society, Volume 13, June 4, 1921, pages 629-633.

Mr. Minor's article deals chiefly with a discussion of the problem of standardizing tests in order to make them useful for vocational guidance. He believes that our need is for an elaboration of standard test data and for a careful interpretation of these standards when available. We do not need measuring scales. The army tests provided accurate scales.

He discusses the problem of standardizing tests under two heads: (1) the measurement of occupational types, and (2) the measurement of the most stable workers within an occupational group.

He refers to the fact that the army test data showed the central tendencies and the range of the middle half of the workers in a variety of occupations represented in the draft. This gave us an approach to a quantitative statement of the ability found among unskilled, semi-skilled, and skilled workers, business and clerical workers, and finally for those in the professions.

Mr. Minor reviews Mr. Proctor's results with tests of 930 high school students. The students test scores in relation to their vocational ambitions show that ten in a hundred were apparently in the lowest quartile of tested ability for the types of occupations for which they aimed to prepare. The results showed that at least

four percent registered inability to enter professional semi-professional, business and higher clerical positions.

He presents some data with chart of score of tests of one group of salesman from the test data on 2,500 people in occupations which have been collected by the Bureau of Personnel Research at the Carnegie Institute of Technology. The test used was a modified form of the army test, arranged in a spiral of repeating tests of ascending difficulty. The lowest grade salespeople shows an average of fifty-one, with range of middle half from thirty-six to seventy. The next better group (wholesale order-takers) averaged eighty-nine with range from fifty-nine to 121. The third group was made up of insurance salesmen. The average was 112 and the range of its middle half was from eighty-two to 138. The highest of the four groups were selling a highly technical product which required in addition to sales ability a complete technical college training. This group averaged 139 and its middle half ranged from 124 to 155. These results more definitely describe ranges of tested mental ability within which any salesman might find a group of competitors with lower mental ranges than his own.

Mr. Miner considers, in regard to the standardizing of tests for placement or the discovery within an occupational group of the most stable workers, the ability of the group in the occupation in rele-

tion to the length of service of these workers on their job. After a year's measurement by the Staff of the Personnel Bureau, it was found that the turnover of employees is decidedly greater for certain abilities within the occupational group. In one group it may be those of lowest ability who remain longest, in another those of highest or of medium ability. They found a correlation of forty-five one-hundredths between tested ability and length of service in some groups. He concludes that the problem of vocational placement is not always to find the ablest man to send to a job. Overstocking in promotion material in low grade jobs may account for employers' large labor turnover.

He states that tests can be used for the selection of employees and also for assistance in guidance and selection. He is convinced that occupational test information is very important.

This investigation carefully carried out by Mr. Miner accents the importance of psychological tests both in job analysis and in the analysis of the qualifications of the individual for vocational guidance and selection.

Murray, Elsie (Sweet Briar College, Virginia.)

Psychological Tests as Diagnostic of Vocational Aptitudes in College Women.

Journal of Applied Psychology, 1920, 4, 30-8.

Miss Murray has made a study of the problem of adapting the

technique of psychological testing to college students in order to determine their fitness for various fields of activity. She explains in detail the utilization of tests, evaluation of scores, interpretation of the resultant ratings, the correlations of test rankings with corresponding estimates and the correlation of test ratings and academic standing.

Data of correlations are given. She states in her summary:

"1. Scores obtained from a series of tests distributed over a number of months in the junior and senior years, when pooled in four sets to measure General Intelligence (or Teaching Ability), Accuracy (or Clerical Ability), Practical and Social Ability, respectively, afford evidence of decided dissimilarity in the four functions measured.

2. Classmates' estimates of each other's ability furnish additional information of vocational interest, and to a certain extent corroborate the findings of the tests.

3. College grades based upon freshman and sophomore courses appear on the whole to be less reliable than those of later years as indicators of real ability and differentiation of talents.

4. Comparison of the students' own vocational choice with the various test scores reveals a fairly high degree of correspondence between individual ambition and experimental findings.

5. The test data accumulated are applicable to a variety of academic problems"

Miss Murray states that the study can be regarded as tentative only from the point of view of vocational guidance, since the experimental procedure and securing of estimates have not as yet been checked up by post-graduate study of the individual. At the same time she believes that the distinct aptitudes which fit or unfit the individual for the four lines of work tested were fairly demonstrated by the test ratings.

She deems that the use of test is invaluable in stimulating the student to more careful weighing of alternatives and qualifications in the choice of a vocation, in accentuating the need of careful preparation, and in demonstrating the value of a wider range of choice in electives, to counteract the tendency toward too narrow specialization.

Miss Murray's investigation brings to light some interesting facts which tend to show that psychology may be of assistance in the selection of vocations.

Myers, Charles S. (Director of Psychological Laboratory, Cambridge University.)

Mind and Work, Chapter III, pages 71-92.

G.P. Putnam's Sons, New York and London, 1921.
Vocational Selection.

Dr. Myers presents an excellent discussion of the unsuitabil-

ity of the workers for the particular work they adopt together with the remedy for it.

He discusses the mental and physical differences which distinguish individuals from one another. These differences cause some to succeed in every occupation better than others. He believes much can be done to prevent the "round peg" from getting into the "square hole" by scientific vocational guidance. This will include a careful physiological and psychological analysis of (1) the requirements of different occupations, and (2) the individual mental and physical differences among those intending to work at them.

He illustrates the benefits derived from the use of psychological tests in several occupations, among which was, for example, the selection of applicants for telephone-exchange work in the United States. Acuity of hearing, clearness of speech, ability to interpret indistinct words, span of memory for figures, memory for the order of instructions received, speed and dexterity of reaction to signals, are all easily capable of estimation by tests, and the tendency to nervous breakdown can be removed by the selection of suitable applicants.

Dr. Myers names a number of available tests that may be used with obvious success. He reviews briefly some of the uses of the psychological tests in the army, air service and admiralty, during

the war, and states that it is generally agreed that such tests saved many months of needless camp life and that by means of them the right man was far more often put in the right place.

The object of tests is not to replace, but to supplement, the "general impressions" which an interview can afford. General impressions are notoriously unreliable besides being insufficient. The object of psychological tests is, so far as possible, to substitute scientific methods of universal validity in place of individual intuitive, often capricious and prejudiced, opinions.

The first requisite is to ascertain what special psychological processes are required for success in the occupation for which the tests are needed. The next step is to ascertain how closely success or failure at the tests which have been devised in order to measure these processes is correlated with known success or failure at the occupation in question; this is determined by a comparison of the order of excellence in the workshop as determined by the estimates of foreman, by piece-rate earnings and so on. Next, the tests which show insufficient correlation are "scrapped" and the useful tests are "weighted" according to their different proved degrees of correlation. Finally, the tests can be applied to the actual examination of candidates whose capacity for work it is desired to estimate. Thus, the likelihood of the candidates' success in any particular occupation can be estimated.

Dr. Myers favors pre-vocational training in the highest standards of our elementary schools that the boys and girls may know the demands, attractions, dangers, and rewards of the chief available trades and professions. Vocational guidance should be encouraged during the period of continuation school, at the "works" or outside, due regard being paid to the development of special tastes or capacities after the school-leaving age. By the use of psychological methods and principles to vocational guidance and selection beneficent results will surely be attained.

Dr. Myers has made an excellent presentation of the needs for psychological methods in vocational guidance. His writing is based upon his large experience in research work and contains expert knowledge of the subject under discussion.

Official Report

Psychological Examining in the United States' Army

Memoirs of the National Academy of Sciences, Volume XX, Chapter 15.

Washington, D.C.

pages 819-837.

Intelligence Ratings of Occupational Groups

The relationship between intelligence and various occupational groups of the army is explained thoroughly by concrete methods. Numerous tables based upon a careful analysis of the data obtained through tests are set forth. One hundred and fourteen occupations considered to be of especial value to the army were studied and reclassified into fifty-nine general occupations.

All record cards containing alpha grades of literate white men were classified for these fifty-five occupations. The scores or grades were tabulated, the number of cases in each occupation noted, and the first quartile, median, and third quartile and scores calculated. Each occupation was ranked with all the other occupations according to the median scores. From the lowest to the highest median scores the groups rank as follows: unskilled labor, semi-skilled labor, skilled trades, technical trades, and professional workers.

The Division of Psychology of the Surgeon General's Office directed the search for a reliable table of occupational intelligence standards. The data of this investigation were assembled and analyzed by Dr. J.W. Bridges whose work was completed in September, 1918. Reports had been received from sixteen camps. He found that for many occupations there were too few cases to give a reliable range or central tendency. Upon the basis of reliability of results, the one hundred and fourteen occupations were grouped into five classes.

We are given the tabulated results of seventy-four occupations including range of cases and number of persons in each. Two general criticisms are discussed: (1) limit of data to draft quotas only; (2) accuracy of the personnel methods in classifying recruits occupa-

tionally and in differentiating between levels of intelligence.

However, the results indicated that the table of occupational intelligence standards could be used in the army with resulting increased efficiency in the placement of men.

A good summary of the classification of occupations in the army by their scores and ratings.

Oschrin, Elsie (Barnard College, Columbia University)

Vocational Tests for Retail Saleswomen

Journal of Applied Psychology, Volume 2, pages 148-155.

Miss Oschrin presents an account of a study made upon saleswomen to determine a vocational correlation for sales ability of the lower grade type found in a retail department store.

A group of eighteen women were tested with a list of thirteen tests, eleven of which were standard tests. The standard tests were

1. Trabue Completion - Scale A
2. Number Checking
3. Opposites
4. Mixed Relations
5. Verb Object
6. Substitution
7. Color Naming
8. Hard Directions
9. Knox Cube
10. Cancellation
11. Association - Kent - Rosanoff.

The two new tests were rearrangement tests. Two tests - one of animals, the other of cities - were presented with the letters in random order. They were limited to ninety seconds for each test and were told whether it was animals or cities they were to name.

The remainder of the tests, except color-naming and Knox Cube, were given in groups, the time-limit being that of the first subject finished for all but the Frabue Completion, for which four minutes were allowed. Color name and Knox Cube were given to each member of the group individually. The group was tested over a period of six weeks.

Seven objective ratings of each member of the group were obtained. These were

1. Buyer's estimate
2. Salary
3. Teacher's ranking for salesmanship
4. Ranking for General Intelligence by the teacher
5. Average Ranking
6. General Rating
7. Selected Group Judgment.

The scores made in the thirteen tests were ranked for each test and correlated with the seven objective ratings by the Spearman formula. Tables of statistics are given.

The evidence throughout the experiment seems to indicate that the type of sales ability called for in a retail department store is a fairly measurable function in terms of mental tests, with which it shows a definite tendency to correlate positively. Vocational Selection may very well be made upon the evidence of performance in such tests. The three tests which correlated with an accuracy of .62 were: mixed relations, opposites and rearrangement of animals.

This study is of especial interest for the vocational psychologist, for it demonstrates that tests may be used with advantage in determining abilities in retail salesmanship. However, a group of eighteen is too small a number to enable one to draw definite conclusions.

Payne, Arthur Frank (University of Minnesota)
The Scientific Selection of Men
Scientific Monthly, 1920, 11544-548

The article presents a review of some of the work of psychologists, during the late war, in the placement of men. Also, an investigation into the validity or non-validity of the pseudo-sciences of phrenology, physiognomy, character-reading and character-analysis. In the scientific selection of men these pseudo-sciences have no part.

This article clearly sets forth that scientific selection of men is not in any way concerned with phrenology, physiognomy, character-analysis, or other charlatanism.

Poffenberger, A.T. (Instructor in Psychology, Columbia University)
New and Practical Methods of Measuring Vocational Fitness
Scientific Monthly, March 1921, pages 205-211.

Mr. Poffenberger compares the difference in mental capacities to the differences in physical characteristics. He makes clear that since the mental adjustments which need to be made are less obvious than the physical ones, the psychological measure is infinitely more important in order that misfits may be corrected before it is too late for readjustment.

He tells us that there are other natural traits that are not directly dependent upon intelligence, but which are just as vital for success; he calls these "character traits". He describes briefly several forms of psychological tests that he deems necessary for complete measurement, viz, the intelligence test, the character test, the educational test, and the trade test and others.

He stresses the importance of their use in measuring vocational fitness.

This article by Mr. Poffenberger is valuable in that it directs the attention to the use of psychology as an aid to the best development of children. It is good theory.

Pressey, S.L. and L.W. (Indiana University)
Measuring the Usefulness of Tests in Solving School Problems
School and Society, November 27, 1920.

This article deals with methods for the use of scale measurement with a discussion of the utility of cross-out scale and the Primer scale. Research data are given. The conclusions are:

1. The cross-out scale is about eighty percent efficient in correcting extreme misplacement in junior high school.

2. The Primer Scale, given two weeks after school began in September, is more efficient than teachers' judgments, made a month after the beginning of school.

They urge the need for the development of more simple and direct statistical methods in scale measuring, and for study of the usefulness of tests and scales in dealing with particular, concrete problems. They think that combinations of tests of intelligence with test achievement may prove to be more useful, for many practical purposes, than either type of test alone.

This scientific investigation is well taken; the authors' plea for more simple and direct statistical methods is pertinent.

Richmond, H.A.

Selection by Tests

More Work Per Man by Van Deventer

New York, The Engineering Magazine Company, 1921, pages 8-12.

Mr. Richmond presents a discussion of Selection by Tests in which he reports their results in a certain factory where a study

was made to determine the reliability of tests in the selection of clerical workers. On the basis of the tests, 188 applicants were selected and were followed up at intervals of one month. Of this number seventy-five percent were called "good" by their superiors at the end of the first month. At the end of the second month eighty-nine percent were called "good" while at the end of the third month the percentage was ninety-two.

He calls the two general types of tests used in the selection of employees as Proficiency tests, and general intelligence or mental alertness tests. He states that by the use of proficiency tests one can determine the extent of a man's knowledge in a given occupation in about ten minutes and avoid the old method of hiring and firing. He believes these tests are especially helpful in selecting blacksmiths, stenographers and typists. They are not adequate for testing salesmanship because a great deal more than mere knowledge is involved.

The general intelligence test, although it takes no account of acquired skill or proficiency, is very helpful because there is hardly any kind of work where general intelligence does not play some part. In clerical and executive work the intelligence test alone may give a fairly reliable index of a man's probable success, at least it will tell us what men are quite certain to fail because of the limitations of their mental endowment.

Mr. Richmond mentions the success of the tests for predicting a person's ability in music in advance of any musical training. Tests of this sort were used in selecting gun pointers for the navy and in selecting aviators.

He believes that tests are limited in their usefulness in determining an employee's value to the firm, because the basic characteristics which make up personality and character are not measured by the tests.

Mr. Richmond's article presents good theoretical judgment for the use of tests. He recognizes the fact that they have limitations.

Roberts, Ralph S. (Recently Captain, Sanitary Corps, Division of Psychology.)

The Use of Psychological and Trade Tests in a Scheme for the Vocational Training of Disabled Men.

Journal of Educational Psychology, 1920, 11, 101-108.

Mr. Roberts states that psychological and trade tests in Vocational Guidance may be divided into two groups. Those of the first group are designed to select persons for definite sorts of work. Those of the second group are designed to select a definite kind of work for the person to be trained.

He reviews the work done by psychologists in the World War and states that no one at the present time can estimate the far reaching effects of this work. Psychology can assist by enabling us to discover the quickest and surest method of bringing the disabled back to

a useful life. This may be approached by means of scientific vocational guidance which necessitates both job analysis and man-analysis.

Mr. Roberts states that classification of individuals can be accomplished by use of intelligence tests, trade tests, and expert interviewing. That a man must be selected for specific lines of training in terms of what he can now do, and assigned only after an exhaustive analysis of his qualifications and of job specifications, is his firm belief. He believes that vocational guidance can be scientifically conducted and that psychology supplies a large part of the foundation on which the successful vocational structure must be built.

Mr. Roberts presents a well-written article and in view of his citation from the army tests his theories are reasonable.

Rogers, Agnes L. (Goucher College)

Mental Tests as a Means of Selecting and Classifying College Students
Journal of Educational Psychology, 11, 1920, pages 181-192.

Miss Rogers presents an excellent description, with data, of tests applied to a group of ninety-eight seniors and 182 freshmen at Goucher College. Her Purposes were (1) to determine their reliability as measures of mental capacity for college women; (2) to weigh their worth as indices to future academic success; and (3) to estab-

lish in the event of their proving satisfactory in the foregoing respects adequate standards both for the selection of candidates for admission and for the classification of entrants in the various divisions of the larger courses, required and elective, in accordance with capacity.

Miss Rogers averaged all the grades obtained by the students in all courses as a measure of academic accomplishments and worked out their correlation with the mental tests. She presents graphs and tables showing the various relations of mental alertness to academic standing. She found the limitations of the tests as indicators of academic success very striking, and further, that the reliability coefficients of the tests showed that they did not measure with sufficient accuracy the traits they gauged.

In spite of these defects, however, Miss Rogers found that certain capacities essential in academic work are undoubtedly measured by the tests and that they are superior to hap-hazard guessing as a basis for allocating students to sections on grounds of mental capacity. She states that the need for a more satisfactory method of determining fitness to pursue a college course is great and mentions that Columbia and other colleges for men have adopted psychological tests. She feels, however, that this new instrument should itself be carefully tested before it is accepted as a satisfactory solution of the problem.

This instructive article by Miss Rogers is a contribution to vocational selection, because her investigation was scientifically

conducted and the results obtained demonstrate the necessity for further development of the tests before they can be accepted as an infallible guide in the solution of the problem of college placement.

Rural, Beardsley (Instructor in Psychology, Carnegie Institute of Technology)
The Extension of Selective Tests to Industry
American Academy of Political Science Annals, 81, 1919, pages 38-46.

Mr. Rural presents a review of the methods used in the army in placing men and suggests ways in which similar methods might be used in industry. The army solved the problem of bringing man and job together with due regard to the qualifications of the former and the demands of the latter. This necessitated the study both of the job and the individual.

The study of army jobs yielded first the Tables of Occupational Needs which specify the skilled complement of military units, and second, the Trade Specifications and Occupational Index which describe the qualifications that are implied by army trade names.

In determining the qualifications of men coming into service, the army used the physical examination, the interview, the intelligence test and the trade test. The army intelligence test gave ratings of mental alertness which were useful in three ways: (1) They indicated those individuals of such inferior mental ability that their presence in a military unit would retard training to a prohibitive degree, men who might even become a menace to the unit in critical situations; (2) The ratings showed men of superior grade who might be considered for advancement, and

(3) the ratings were used to equalize the alert and the sluggish in the companies of a regiment.

Intelligence tests which proved so successful in the army may be used with considerable value in industry. They may be used in hiring the applicant and in readjustments in the working force itself. They may be used to place men in positions where their abilities may be used and their creative interest exercised. They may be used to place the mentally slow where the work is within their abilities. This will spare them the worry and uneasiness of trying to do work beyond their power of intellectual adjustment.

Mr. Ruml warns us that great care must be taken to modify the intelligence test for industry so that it will be really able to do the work expected of it. The army intelligence tests measure general mental ability, not specific mental traits.

Trade tests, as well as intelligence tests, were used with great success in the army. In preparing a test for a trade, the trade was analyzed, not merely to find the kinds of jobs, but also to discover bits of information peculiar to the trade and to pick up characteristic terminology that might be diagnostically significant. After a try-out of questions formed after this analysis the elements which had the highest diagnostic value in detecting trade ability were selected and put in form of an army trade test.

Army trade tests have been of value in determining the skill of tradesmen. This was especially true in the case of sending skilled men overseas for immediate duty in certain trades. It was successful in its determination of technical qualifications which were to be the basis for military assignment.

The trade test method may be applied to industry in hiring, transfer, and training. It is a direct method of measuring trade ability and is to be preferred to other methods in selecting employees. It is a method for measuring proficiency in the various activities of an occupation and is hence valuable in all matters involving shifts in the working force. It will make more intelligent and less uncertain the transfer of particular men to different work. The information secured by the trade test method is connected with the educational program of an industry. Individual weaknesses in technical strength may be removed. In addition, a systematic program for promotion would be very beneficial to the workers and give better service to the management.

Mr. Ruml believes that it is only through experimentation that the results mentioned above may be achieved. He states, however, that both intelligence tests and trade tests give promise of becoming methods of considerable importance in our industrial life.

Mr. Ruml's article contains a good account of the intelligence and trade test methods in the army with suggestions for similar applications of their technique in industry.

Seashore, Carl Emil

The Psychology of Musical Talent

Boston and New York Silver Burdette Company, 1919.

Dr. Seashore states that the measurement of musical talent is not one measurement but a large number of measurements which must be built up into a system so as to represent fairly the most salient features of musical talent.

He set himself the task of making a complete survey of the individual as a singer and to measure specific abilities and achievements. He studied the sensory, motor, associational, and affective qualities of the individuals in order to determine their native endowments and abilities as singers. By means of standard laboratory apparatus, and, in many cases, especially invented appliances, he was able to determine whether the individual under observation was psycho-physically capable of hearing and making music.

Dr. Seashore's method of discovering and measuring creative imagination is unique. He gives the subject a set of words without music and allows him or her, as the case may be, to improvise a melody. The result is recorded on a dictograph disc, later to be studied in detail. Timbre, volume, upper and lower tonal range, emotional and affective qualities and powers of association, are all noted and evaluated.

The author states that if the singer practiced, meanwhile con-

stantly watching the pitch-recording device, her defect could be corrected. He settled many long-standing disputes between various members of an orchestra as to exactness of pitch during an evening in which he was host at a dinner for them. He did this by his experiments made individually.

Dr. Seashore makes no exaggerated claims for his work. He states very definitely that the methods cannot be reduced to mere mechanical forms so that every teacher can use them. A high degree of skill in administering the tests and using the apparatus is needed. Also, the tests only have significance when compared with previously established norms. At present that work is not completed. In music insurmountable difficulties may be detected and years of profitless training avoided.

Is it too much to hope that what the application of psychology has made possible in music may also be made possible in the other vocations?

Shefferman, Nathan W. (Consultant in Personnel and Employment Management)
Employment Methods
New York. The Ronald Press, 1920.

Mr. Shefferman, who has had broad experience in the employing and handling of men while Personnel Director for Lycoming Foundry and Machine Company, Baltimore Copper Smelting and Rolling Company and C.F. Sauer Company sets forth his ideas and beliefs in regard to the use and results of the application of psychological tests in industry.

He states that the employment man cannot afford to make a hobby of any of the psychological tests methods. However, he should be familiar with them all and make himself as proficient in their use as possible. Education, training, previous environment, likes and dislikes, ability to make and hold friends, home life and hereditary influences, exercise such an influence on a person's life that no analysis or judgment can possibly tell a true story unless rounded and completed by these essential elements. The employment manager should supplement his work with observations, queries, and tests more than ever; but he should not place too much faith in any of them.

Mr. Shefferman informs us that the store, office and bank, whenever possible, are including them as a part of the employment scheme. In some places absolute dependence is placed on their value, an employee's capability being graded in accordance with the ratings, deducted from the test. He thinks their value is greater in business institutions than in industrial plants because the former are more directly concerned with mental equipment and general intelligence than the latter.

He states that the Metropolitan Life Insurance Company is applying psychological examinations to each applicant for employment. This examination was prepared by Professor Thordike of Columbia University and seeks to measure the mental ability of the applicant.

The examination was based upon a careful study of the work required in the various divisions of the Home Office, in the hope of placing a successful applicant at the work for which he is best fitted.

The author states that tests for Comptometer machine operators are generally used successfully. One large office employing more than 3,000 people gives group tests for clerks, stenographers, etc., following the example of the army, for the saving in time it allows.

He gives an outline of some tests which are used in the R.H. Macy and Company store, as typical of those used in many department stores.

He believes that tests raise the standard of employees. As a result of tests used in department stores, R.H. Macy's for example, it is possible to install training classes to develop employees from a fixed minimum requirement to a higher standard. The tests disclose the weakness and thus show where training should begin. Under the test system, only the desirable applicants are employed.

The latest and the most generally accepted of all the employment methods according to Mr. Shefferman, are the trade tests. He states that they tried and proved expedients.

The book contains a very good argument for the efficacy of psychological tests. No concrete data, scientifically worked out, are given.

Simons, A.M. (Author of 'Social Forces in American History')
Personal Relations in Industry
New York. The Ronald Press Company, 1921.

Mr. Simons was formerly manager of the Personnel Department of the Leffingwell-Beam Company and had actual experience in the selection of employees.

He states that the employment methods have changed from the foreman's opinion and erstwhile superficial methods into a scientific system of adjusting the available workers to the most suitable positions through the use of standardized application blanks, references, records, and interviews, all used to fill standard job specifications. The worker's ability to satisfy such specifications is not determined by guessing, but by physical, mental and trade tests which are constantly growing in value and accuracy.

Mr. Simons presents good theory in favor of the use of psychological tests in industry.

Snedden, David.
Vocational Education
New York. The MacMillan Company, 1920.

The Social Need for Better Vocational Education, Chapter II, pages 30-71

Mr. Snedden states that a few individuals seem born with mathematical or musical or combative powers. It is probably also that some persons are born with qualities of leadership, business organiza-

tion, mechanical invention, or artistic ability.

Experience seems to prove that there is an "optimum" job for every individual and it is important both for himself and for society that he be helped to the discovery of his occupation or life work as near this optimum as possible.

Mr. Snedden refers to the fact that the army psychologists, by means of simple psychological tests, were able to allocate youths or adults to the forms of study or productive service best suited to them. He believes that it is at present premature to summarize the possibilities revealed.

He states that every supervisor, director, and teacher in vocational schools will find it important to ascertain the optimum requirements (always judged by sane and practical standards) both of the vocations open to those whom they endeavor to guide, and of the inherent abilities possessed by those desiring to enter these vocations.

This sketch contains very good theory in regard to the need for scientific methods of placement; both in analyzing the job and the individual. Mr. Snedden's conclusion in regard to psychological tests for vocational guidance is indefinite.

Thorndike, E.L. (Teachers College, Columbia University)
The Reliability and Significance of Tests of Intelligence
Journal of Educational Psychology, 11, 1920, pages 284-287.

Dr. Thorndike presents certain data concerning the reliability and significance of a twenty-minute examination of the general type of Army Alpha such as Pressey-Pressey, Otis, Virginia Survey, and the new National Research Council tests.

After giving eight consecutive tests to different grade pupils, he gave two trials with two different forms of the test on 146 sixth grade pupils, 105 eighth-grade pupils, forty-six adult tradesmen, fifty-four army officers and forty-two university students.

He states that this is not a satisfactory degree of precision but about what would be expected from a twenty-minute test. An examination of twenty to fifty minutes whether oral or written is adequate to make with surely only coarse distinctions among individuals. But it is adequate, if properly used, to decide whether an individual should be examined further with respect to any practical issue, such as commitment to an institution, or promotion in school, or employment at a certain job.

His data show that verbal and non-verbal examinations do not measure the same mental ability. He gives the tables of correlations between the two groups of tests. Dr. Thorndike concludes that intelligence is not one thing but many and that the abilities

measured by a speed test with language and mathematics are not identical with, or even very similar to, those measured by a test with pictures and less exacting in speed.

This scientific investigation of Dr. Thorndike's is very pertinent at this time. For the popular opinion seems to be that vocational fitness may be entirely determined by tests and studies like the above will tend to cause the enthusiasts to realize that at least a number of tests are necessary.

Van Wagemen, M.J. (University of Minnesota)
Some Results and Inferences Derived from the Use of the Army
Tests at the University of Minnesota
Journal of Applied Psychology, 1920, 4, pages 59-72.

Mr. Van Wagemen states his mode of procedure and results with a series of tests given the freshman classes of the University of Minnesota for two years, 1917-18, and 1918-19.

The Alpha Army Test and individual tests were given. The correlations of the scores of the Army test and also the correlations of the scores of each of the individual tests with the averages of the college grades were worked out. Mr. Van Wagemen felt more concerned in finding a basis for predicting vocational aptitudes than in learning whether or not the student would probably succeed in his college course. He found the astonishing result that the

Army test, which took only forty-five minutes of time, would predict the student's probably success in making academic marks. He presents tables showing actual differences.

The discrepancy between the positions attained in the Army Tests and those achieved in academic marks were too large to warrant the use of the Army Tests for purposes of rigid selection. Mr. Van Wagenen believes, however, that mental tests such as the Army Tests, are improvable to the degree that their use will be feasible in selecting and classifying college students, but that because of the inaccuracies of college marks as measures of academic achievements it will not be feasible to accurately determine the full prognostic value of the tests.

He concludes from this research work that inasmuch as students' interests tend on the whole to cause them to seek the occupations for which they are by nature the better fitted that mental tests may in time be used both as a means of predicting chances of success in college and as a basis of for giving the student more accurate advice in the matter of selecting a vocation.

Mr. Van Wagenen recognizes the limitations of the tests and states that it will be a long and arduous task requiring cooperation on the part of educational leaders before worth-while results can be accomplished. This careful research work on a concrete problem is, in my mind, a good effort toward placing tests in an important position in vocational selection.

Watson, Max

Trade Test Principles

More Work per Man. New York Engineering Company, 1921.

Mr. Watson believes that the principles developed by the Division of Army Trade Tests are of such importance in the field of scientific selection that they will ultimately be used in industry.

He favors the introduction of the trade test principles into industry by the interview and not as a separate test which would give a definite score. This interview shall be standardized or so fixed that the essentials such as a knowledge of (a) material, (b) tools and equipment, (c) operation can be readily brought out.

This method would largely eliminate the objection on the part of the applicant to being examined in a formal way and would at the same time make it impossible for a man to "bluff" on his previous experience. He gives the following rules for framing trade test questions:

1. Do not use a catch question (It antagonizes the applicant)
2. Do not use a question with a guess answer
3. Use trade language (The vocabulary of the tradesman is limited)
4. Do not use a bad practice question. A good mechanic should not be expected to know how to do things the wrong way
5. Be sure that the meaning of all questions is definite.
6. Do not use a question that calls for a long explanatory answer.
7. Be sure that the question involves only such knowledge as must come within the field of experience of a first-class tradesman.

Mr. Watson gives examples of trade questions of different trades. For these, see pages seventeen and eighteen.

He concludes with the statement that every employment man recognizes that more accurate selection means increased efficiency and lessened turnover. The use of the trade test form of question, having a predetermined value, has been proven to be a surprisingly accurate means of measurement and should ultimately find its use in every employment office.

Mr. Watson's article presents a good statement of the belief of the majority of psychologists regarding the use of the trade test. No data are given.

Watts, Frank (Lecturer in Psychology in the University of Manchester and in the Department of Industrial Administration, Manchester College of Technology.)
An Introduction to the Psychological Problems of Industry, Chapter IV, pages 67-98. New York. The MacMillan Company, 1921.

The book deals mainly with the psychological problems of industry. The author believes that the psychologist should be able to supplement on the human side what has been so extraordinarily well done on the material side to increase the efficiency of our industrial system. He states that the scope of psychology is more or less vague, but he calls attention to the need and possibilities of service for this new science and gives examples of its practical utility. An important

branch of the psychologist's work is to help select scientifically the right man for particular forms of employment.

Mr. Watts traces the causes of inefficiency and unrest through the direct effects of modern methods and conditions of work upon the workers and through the nature of human relationships established in industry. He believes that each person has within him decided native tendencies determining his interest and abilities and that the first thing to be done in choosing workers for particular pursuits is to determine whether their instinctive type is the right one for the task. He thinks the next few years will prove whether tests can be constructed for this purpose.

He states, however, that in the majority of occupations the principal factor to be considered will be intelligence which is closely akin to instinct, that although the mechanical factors play their part in general efficiency, they weigh less in the effectiveness of the final combination of qualities than the factors of a higher type. It is because of this that intelligence tests which have called for the highest qualities in their performance have proved most successful in use, and are, therefore, considered to be one of the most valuable contributions by psychologists to industry.

Mr. Watts believes that modern life is becoming increasingly suited to those people who possess quickness of mind rather than

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profundity; and hence the most valuable qualities a person can possess are the speedy thinking and enterprise. These qualities are the ones the intelligence tests disclose.

He reviews briefly the splendid service that the application of psychological tests rendered the American Army in the late war, but states that he cannot agree with Dr. Goddard that these tests are a fair indication of the mental powers of his countrymen. He thinks they tap only one kind of intelligence. He summarizes his principal adverse criticisms as follows:

1. They over-emphasize the factor of speed in intelligent reaction. While they may be excellent for the diagnosis of ability to fill minor executive positions where promptness and despatch are important, they would rarely reveal an Edison or a Darwin if of slower reaction but of enormously greater intelligence.

2. They place workers who do not follow clerical occupations at a disadvantage. That is, they do not test abilities which are often largely independent of general intellectual ability, so that there are qualities of intelligence which may not find a natural means of expression through these tests.

3. They neglect to take into consideration temperament, specific interests which are not literary or mathematical, and other emotional factors. In short, to show an inability to score at these tests may not mean that the subject is unintelligent.

Even if speed be overemphasized, experimental work shows that speed does not mean carelessness but that one good quality most often indicates the presence of other good qualities. And even if the army tests will fail to reveal an Edison or a Darwin, they reveal the abilities of the general population and Darwins and Edisons are rare.

Dr. Watts believes that when the psychological test is perfected it will be useful in three distinct ways: (1) it will eliminate personal bias. (2) The psychologist is often able to provide standards or norms calculated from the performance of many thousands of subjects, so that the performance of any fresh subject can be readily compared with the average performance. (3) The application of the psychological test saves time.

He describes the construction of tests and states experience will point to the advisability of each industry developing its own types of intelligence test.

He believes that the fact that certain mechanical aptitudes are essential to the development of skill in any occupation does not mean that we should overlook the equally important fact that interest and intelligence are needed to sustain them in working efficiency. He states "The opinion most popular at the moment is that there is a place in the industrial mechanism where each of us should naturally

be fitted, and that once there we shall find that all will be for the best for all possible worlds." Man cannot be reduced to a mechanism and unless outlets for initiative are accessible to all, vocational selection may be rightly suspected as a sinister method of stereotyping status in the industrial world.

This book in the writer's opinion is one of the most valuable of the theoretical ones in this field. Mr. Watts deals in a sane and impartial manner with both the employee and employer and makes it clear that this new science can prove of inestimable value in the vocations. His reasoning, clear and logical, is clothed in simple language that can be readily understood. He is modest in his claims for psychology. He never loses sight of the human side of the laborer and his suggestions for the application of psychology to industry are in my opinion valuable not only to the workers but to society as a whole.

Weaver, G.G.

Trade Tests, Their Construction, Use and Possibilities in Industry
Industrial Arts Magazine, May, 1921.

Mr. Weaver calls attention to the definite benefit industry has received from the application of the trade tests worked out in the army during the world war. He defines a trade test, explains its construction and statistical treatment of results. He gives a sample

of trade tests and indicates situations in which the trade test may be utilized.

He considers trade tests impractical for jobs where loyalty, ability to learn, initiative, general character, etc. are essential factors. However, while Mr. Weaver points out the inadequacy of the trade test as an indication of the presence of the above mentioned qualities, he does commend these tests as an important step in the right direction.

Mr. Weaver is correct in his conclusions that trade tests cannot measure general character. Psychologists agree on that. They measure only special skill.

Williams, J. Harold

The Intelligence of the Delinquent Boy

Journal of Delinquency, Monograph 1, 1919, page 198.

This excellent monograph presents the results of an intensive study of 470 delinquent boys, most of them at the Whittier State School. They are classified into five groups, superior, average, normal, borderline, and feeble-minded. Only fourteen boys were found in the superior group, whereas over half were found in the borderline and feeble-minded classes. This seems to show that delinquency is most frequently found in the groups who rank low in intelligence.

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This study by Mr. Williams tends to show that psychological tests can be of very great service in enabling us to readily separate the feeble-minded children from the normal group. Many of the would-be delinquents may be saved by placing them in a proper environment where they can be trained for some occupation within their intelligence.

Woodworth, Robert S.

Psychology

Henry Holt and Company, 1921.

Intelligence. Chapter XII, page 271.

Dr. Woodworth tells us how intelligence is measured, what it consists in and presents evidence of its being largely a matter of heredity.

He states that intelligence tests in expert hands actually give a fairly reliable measure of the individual's intelligence.

Since most writers on vocational selection admit that the measure of the individual's intelligence is a prerequisite for determining the right placement of workers, Dr. Woodworth's statement of how this may be accomplished will be appreciated.

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Yerkes, Robert M. (Chairman, Research Information Service, National Research Council.)

The New World of Science

New York. The Century Company, 1920.

What Psychology Contributed to the War. Chapters 20 and 21, pages 351-359.

The great service of psychology during the war is discussed by Mr. Yerkes under the three heads: Psychological examining conducted under the direction of the Surgeon General of the Army and affecting all arms of the military service, the classification of personnel in the army, conducted under the Adjutant General, and similarly affecting the entire army; and the study of special psychological problems in the army and the navy.

Mr. Yerkes describes the mode of procedure in psychological examining in the army and the principal methods of classification which were used by psychologists. There was, first, measurement of his mental alertness or intelligence by the psychological examination. Second, was the determination, by personal interview or by actual measurement, of the man's occupational training, experience and proficiency. Thus the man was rated, classified, in accordance with physical characteristics, mental ability and occupation and assigned to his place in the military machine.

The psychological tests eliminated chance, personal whim, or bias in measuring and appreciating the human factors in the army, and the success of their application proved that the informa-

tion obtained was reasonably accurate and thorough.

The psychologists found that to examine soldiers individually was too slow to be practical and that examination by large groups was the only feasible procedure. They perfected a system or mode of procedure by which an examining staff consisting of four psychologists and a force of scoring clerks could examine as many as 1,000 men daily.

First, they segregated a group according to the space of the examining rooms (500 could be used if space permitted) and subdivided these into two groups consisting of (a) the literates, men who can speak and read English with a fair degree of proficiency, and (b) the illiterates, men who are relatively unfamiliar with the English language. The literates were given a group examination known as Alpha, which consists of eight markedly different tests. This examination while it requires little writing does demand facility in using written and oral instructions. The illiterate group were given an examination, known as Beta, which is in effect Alpha translated into pictorial form. In this examination pantomime and demonstration supplant written and oral instructions.

The time required for each group examination is about fifty minutes. Subjects who failed in Alpha were usually given Beta to improve their ratings, and those who failed in Beta were given individual examination in order that they could be more accurately and justly rated.

The first thing which appeared in the results of the psychological examination of soldiers was the remarkable difference in the intelligence of individuals and of army groups. The relation intelligence has to the ways of using men in the army was demonstrated by the presentation of results of measurements made in the army itself and exhibited in their relations to the judgments of experienced officers. The charts are presented showing the relation of intelligence to success and failure of men in officers' training schools and the relation of intelligence to success or failure in non-commissioned officers' training school.

Psychological tests were applied in each of these schools and the grades received by each student carefully recorded. Then, months later, after the students were given or refused commissions according to their respective records, a comparison was made between the ratings which each student had received some time previous in the psychological tests and the degree of his success in his efforts to win a commission. This comparison revealed the highly interesting fact that practically all the men who received a high grade in the psychological tests won their commissions and also that only a very small percentage of those who did not receive passing grades in the tests achieved success.

This illustrates the value of the psychological methods of

placement.

1,726,966 men were examined

42,000 men were commissioned officers

7,800 were reported for discharge because of mental inferiority

46,347 men tested under ten years of age in intelligence.

It was noted in the psychological examining that the intelligence of men of different occupations varied not only with the individual but also in quite as definite a way with his occupation. The intelligence ratings of groups representing sixty occupations were brought together. A chart is given (page 378) showing the distribution of intelligence of the middle fifty percent in each occupation. The laborers rank lowest and the engineers highest.

Mr. Yerkes gives a history of trade test development and its application to the occupational classification and placement of men. He illustrates the vital importance of these tests to the army by concrete examples among which are the methods by which the best men were selected to serve as gun-pointers for the armed merchant vessels.

Mr. Yerkes has set forth the most interesting and comprehensive facts in regard to use of psychological tests during the late war. He makes it clear that psychology played an important part in the classification of men in the various occupations and when we remember that our army is but a replica of industry on a small scale we can

understand the important part that psychology can play in vocational selection.

Yoakum and Yerkes
Army Mental Tests
New York. Henry Holt and Company, 1920.

Mr. Yoakum and Mr. Yerkes present a good account of the methods and results and practical applications of the administration of mental tests in the army.

After preliminary trial in four cantonments' psychological examining was extended by the War Department to the entire army, excepting only field and general officers.

The psychologists under the Adjutant General developed and introduced throughout the army methods of classifying and assigning enlisted men in accordance with occupational and educational qualifications; and also methods of rating officers for appointment and promotion.

This work in its relation to vocational guidance was accomplished by the giving of two kinds of psychological tests designated as the group and individual test. The group tests could be given to groups of from one to 200 men. The time required for each group examination was about forty-five minutes, so that one examiner and a small group of helpers could examine between 500 and 1,000 men a day.

The results of these tests were found to be of extraordinary value in accelerating training of recruits, especially in such difficulties as

1. The discovery of men whose superior intelligence suggests their consideration for advancement, for example, to posts as non-commissioned officers.

2. The discovery of men whose low grade of intelligence rendered them either a burden or a menace to the service.

3. The selection and assignment to development battalions of men who are so inferior mentally, that they are suited only for special work.

4. The prevention of undesirable differences of mental strength between different regiments or companies.

5. The early recognition of the mentally slow as contrasted with the stubborn or disobedient.

About two million soldiers were examined with these tests and it was found upon assembling the scores that although the distribution of intelligence scores in any one trade or profession was enormous, they fell into fairly distinct groups according to the civil occupations of the recruits. The unskilled laborers ranked lowest and the engineers highest.

Results compiled from data show that the scientific measurement of general intelligence is of great benefit in estimating whether a person has the general intelligence that is required for average

success in any given trade or profession.

The relation of intelligence to occupation as studied in the army is of very obvious importance for education and for industry. The army studies showed that for wise and effective industrial placement and occupational guidance, two things are essential: first, definite knowledge of the physical and mental requirements (specifications) of the job, and second, equally definite knowledge of the physical and mental characteristics and capacities of the individual to be placed. The application of psychological tests in the army demonstrated that it is now possible to prepare specifications and suitably to classify individuals with reference to intelligence, education and occupational taste. Mr. Yerkes and Mr. Yerkes state, however, that temperament is as important as intelligence for industrial placement and vocational guidance and we have as yet no method for measuring it. They believe that the most dangerous thing that can happen is to have education, economics, sociology and industry accept the results of mental tests uncritically without careful study and additional research. They state in this connection that the army demonstration has proved conclusively that psychology has wonderful value in its application to vocations.

The book presents an excellent detailed account of the application of the mental tests during the war. Data are given to demon-

strate concrete results which makes the book a valuable contribution to the relation of psychology to the vocations.

Yoakum, C.S. (Director, Bureau of Personnel Research, Carnegie Institute of Technology)

Can Executives Be Picked by Mental Tests?

Forbes, January 21, 1922, pages 259-260.

Mr. Yoakum presents in this article a discussion of the use of mental tests in one large concern which operates a chain of stores with headquarters in New York City.

This concern has given a mental-alertness test to each and every member of the firm from the President to the lowest clerk, and office-boy. The test given is a commercial adaptation of the Army Alpha Intelligence Test which was used in the Army. This test is known as Bureau Test VI. The results of this test were so striking that the company has adopted this method of selecting minor executives.

The organization is divided into three groups: Executives, minor executives, and clerks. These groups correspond to distinct divisions within the company. The charts showing scores are given and explained. The highest possible score is 184. Five clerks, for example, made scores between 0 and 20, while only two made scores above 140.

The executives of the company all scored above 60 in the test, and only four fell below 100. The average for the group was 127.

The minor executives ranged all the way from 45 to 166, while the average was 119. In this group only seven individuals out of thirty-five fell below 100. In the clerical group the range of scores was extremely wide - from 3 to 160. The average was only 55. Thus, it is obvious that different levels of intelligence are represented by the different groups.

From the analysis of test results and the supporting facts, (for example, one executive and one minor executive who had scored below 100, and one executive who had scores slightly above 100, were so inefficient that they were asked to resign,) a critical score of 80 was set. This is, it was decided that no applicants for minor executive positions would be hired if they failed to score above 80 in the test, and those scoring between 80 and 100 would be considered only if their other qualifications were especially good.

This plan of selection was adopted by the company ten months ago. During this period 133 applicants have been examined. All those scoring below 80 and 100 were rejected with two exceptions, two scoring between 80 and 100, were hired because of very good recommendations. One of these has already been asked to resign because of his inefficiency. Forty-nine of the applicants scored above 100 and were hired. Of this number forty-two or eighty-two percent are making good, and will furnish dependable material for the making of future executives.

The company is well pleased with the results and have set the critical score at 100.

Mr. Yoakum states the the success of the use of a single test to pick executive material shows that there is direct relationship between intelligence - mental-alertness - and executive capacity. Intelligence, of a given amount, is one essential qualification for a good executive, and the science of applied psychology has developed far enough so that tests of intelligence at least give reliable results.

A list of sample questions are given.

This article shows that at least one concern has found the use of psychological tests of great benefit in aiding in the selection of minor executives.

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