

more than once a young man or woman whose psychological training was limited to a few months' experience as routine assistant in the Army Psychological Corps or in a social service clinic, or even to a few undergraduate courses in college, to succeed in selling service as psychologist to a business executive. The standing of psychology has sometimes suffered because industrialists have judged results from their observation of the work of such amateurs. If you want a consultant in chemical engineering, would you invest in a young man whose training is limited to undergraduate college laboratory courses, supplemented perhaps by a few months as Sergeant in the chemical warfare service? These neophytes are often extremely useful as assistants, but are rarely competent to take primary responsibility in industrial applications of their science. The American Psychological Association maintains a rigid standard of membership and is open only to those who have earned the Doctor's degree in psychology and have published acceptable research. Membership in the Association is a virtual certificate of fundamental training in the science. Orlando Edgar Miller, who only last October was permitted to give some lectures on applied psychology in this room, is not a member. You can ascertain whether or not an alleged psychologist has met the membership requirements of the Psychological Association by writing to the Secretary, Dr. John E. Anderson, at Yale University.

But membership in the American Psychological Association does not guarantee familiarity with or experience in industrial psychology. The Psychological Corporation, with offices in the Grand Central Terminal, will at any time endeavor to answer inquiries as to the experience of American psychologists in particular fields of specialization. With these sources of information, there is little reason why management engineers should not have a basis for discrimination in the selection of the psychologists with whom they may wish to cooperate.

We ask discrimination also in the acceptance and use of research findings. Sometimes a psychological problem has been solved under laboratory conditions or with a limited number of subjects, so that conclusions of a tentative nature have been warranted; but when these findings have been applied without reservation or further trial under factory or office conditions, the results have been unsatisfactory both to psychology and to management. Generalizations resting on slender foundations should be scrutinized closely

and applied with discrimination. I have been warning employment managers for years against hasty use of the results of psychological tests. They should first make careful experiments within their own organizations, with the cooperation of a psychologist who knows statistical method in this field. Only after these try-outs have resulted in a fresh validation of the tests and a determination of the relative weight to be assigned to test scores in comparison with the other available data, should the employing office make any actual use of test results.

In one other regard discrimination is invited. Industrial psychology ought not to be identified exclusively with any single phase or movement such as intelligence tests, or psychoanalysis, or vocational guidance, or mental fatigue studies, or the psychology of practice and skill. Some of these fields of psychological investigation are much less highly developed than others. If you decide that they are vague in practice, or unsound, you will find plenty of competent psychologists to agree with you; but it is hardly discriminating to infer that all psychology is impractical.

3. Psychology asks management for research opportunities. As Dr. Person has so well pointed out,⁷ we need opportunity for research on real problems, on adults rather than children and youths, with suitable facilities and assistance, under factory conditions. To be sure, research of this character is more difficult than laboratory investigation. Conditions are more complex. Variables are harder to control. Nevertheless, the time has come when psychology will advance more rapidly if an increasing number of its investigators are occupied on such problems.

4. Psychology asks management to supply one of the indispensable tools of industrial research, namely, reliable criteria. This point has been already urged. Let me illustrate it again from the much discussed field of tests for vocational selection. An enormous amount of ingenuity and toil has been wasted in devising various psychological tests and other predictive measures of aptitude or accomplishment, and in trying out these measures at considerable expense of time and money on large numbers of employees—operatives, clerks, or sales people—only to discover after all the tabulations of results have been made, that the criteria against which the validity of the tests had to be checked were unreliable.

⁷"Industrial Psychology: A Layman Considers Its Status and Problems," by H. S. Person, *Bulletin of the Taylor Society*, Vol. IX, No. 4, August, 1924, pp. 163-171.

An enumeration of some of the criteria which have been used will show at once how difficult it is to secure from the files of business or industry, data which meet the requirements of scientific work; data reliable enough to serve as checks upon the validity of the proposed methods of prediction.⁸ Time required to train an employee is one criterion. Other things remaining equal, the employee who learns his job quickest is the most valuable. Consequently the rate of learning or the time taken by the new employee to reach a standard proficiency has often been used as a criterion of vocational accomplishment. I hardly need remind you how difficult it is to be certain that this figure, the length of time required to train an employee, is a reliable measure of his learning ability, because he may not have had precisely the same opportunities as others for instruction; working conditions may not have been identical with those of other employees; other variables may have complicated the situation.

Grades or standings given by instructors in vestibule schools have been used. This criterion has some reliability when it is based upon actual measures of the skill displayed at the end of a training course. Other criteria which have proved useful are: amount of losses due to breakage or claims; salary or wages; commissions or bonuses; length of service; rate and degree of advancement in the firm; degree of responsibility held; and the like. Often it has been necessary, however, to resort to ratings as measures of success. But ratings given by supervisors, teachers, or fellow-workmen are notoriously and disappointingly variable and unreliable even though the most improved forms of graphic rating scale are used and the rating is conscientiously and painstakingly done. Ratings are less objective than the other criteria which have been mentioned. They should be used as criteria only when absolutely necessary or as a last resort. Perhaps some management engineer will eventually develop a highly reliable rating method, something of which most psychologists at present despair. Any such rating scheme must meet the same statistical test of reliability that other criteria have to meet; namely, the test of high self-correlation.⁹ There should also be close agreement between ratings given by several

competent judges who are equally acquainted with the men being rated. Such statistically reliable agreement between raters has been found so rarely that ratings ought not to be used as criteria of accomplishment and of worth of the employee to the firm if any more objective, more reliable criteria can be had.

Measures of production furnish one of the most valuable, and one of the most frequently used criteria. These measures may be in the form of amount of work each employee turns out per unit of time, or, if one is studying salesmen, the amount sold. Where salesmen are being compared, it is imperative to watch carefully contributory variables such as relative difficulty of the territory assigned to the salesman, extent to which his market has been covered, nature and amount of his competition, time he has been on the job, and other complications. When in 1916 we first began to study at Carnegie Institute of Technology the problem of selecting salesmen, we gave a great deal of thought to the qualities characteristic of successful salesmen, and to test methods designed to measure these qualities. But when in cooperation with several large sales organizations we undertook to test these tests, we found it necessary to go behind the data supplied as to the relative accomplishment or value to the firm of the salesmen tested. We had to scrutinize with the utmost care the methods of market analysis and quota setting these firms had employed.

In using output of factory piece-workers as the criterion of accomplishment, the same caution is needed. To make certain that these records of output or production or piece-rate earnings are genuinely reliable measures of the ability and value of the employees, is a major task of management. Psychology turns with confidence to this group of management engineers and asks that this particular criterion of accomplishment be made available, and that it be—so far as scientific management can make it—an accurate and reliable measure of the values it purports to measure. Not every manager can furnish such figures of individual output; but in the plant which has long followed consistently the principles of scientific management, it ought to be possible to meet this requirement of psychological research.

What has been said about the need for reliable criteria might be repeated with reference to the control of conditions within the plant. Psychology looks to management to furnish the stable conditions under which scientific experiments can best be conducted; plants with adequate records of their personnel;

⁸"Measurement in Vocational Selection.—An Outline of Research Procedure," by Max Freyd, *Journal of Personnel Research*, Vol. II, No. 6, October, 1922, pages 220 to 224.

⁹E. L. Thorndike, "Mental and Social Measurements," Teachers College, Columbia University, New York, 1913, page 177.