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PERSONNEL CLASSIFICATION TESTING IN THE ARMY

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INTRODUCTION

THE Committee on Classification of Military Personnel, appointed by the National Research Council at the request of The Adjutant General in May, 1940, has completed four years of advisory service. These years have seen striking changes in the nature and scope of the technical problems involved in classifying and assigning officers and men as the Army has entered on successive phases of planning for the national defense, mobilization, swift expansion, participation in a world-wide war and return of service personnel to civilian employment. A short sketch of what has been done during this period will introduce a summary of activities within the past year.

¹ The membership of this committee at the time of its appointment by the National Research Council included also C. C. Brigham, H. E. Garrett, L. J. O'Rourke, M. W. Richardson, C. L. Shartle and L. L. Thurstone. Following the untimely death of Dr. Brigham on January 23, 1943, C. F. Hansen was designated as his successor.

RETROSPECT

Four months before the Selective Service and Training Act was passed in September, 1940, The Adjutant General had asked the committee what steps should be taken to provide aids to general personnel classification and appraisal of soldierly potentialities of recruits and inductees. The question took this form: Should reliance be placed on the standardized vocabulary tests then in use at recruiting stations as aids in sizing up the military suitability of volunteers? Or should use be made of available revisions of Army Alpha, Army Beta and the Binet-Simon Scale? Or had the time arrived to prepare new tests for purposes of screening and initial classification?

It seemed clear that a new general classification test was required, and also an examination which could be given to non-English-speaking men and to illiterates. Tests of aptitudes for training in clerical duties and in mechanical occupations also seemed to be indicated.

To help in meeting these needs was the chief task of the committee in 1940.

During the summer of that year, The Adjutant General established a Personnel Research Section,^{2, 3, 4} called to temporary active duty three psychologists who held reserve commissions, and secured through the machinery of the U. S. Civil Service Commission the appointment of five civilian psychologists classified as personnel technicians. Clerical aid was at first almost non-existent. For several weeks until additional funds were authorized, the chief reliance was on NYA students who came to work on alternate days. Agencies such as the Civil Service Commission, the Bureau of Public Health and the CCC helped out. The Occupational Analysis Section of the U. S. Employment Service assisted greatly by analyzing and concisely describing the more important military occupations, by helping to revise and structuralize the Army's occupational code of civilian and military specialties, and by making available for Army use a volume of Oral Trade Questions to help interviewers in finding out whether a soldier was really as well informed about his trade as he claimed to be.

In preparing new tests, the usual procedures of test construction, try-out, item analysis, tentative validation, calibration and comparison with other tests were carried forward. Data for use in scaling and standardizing the Army General Classification Test were then secured from a population of about five thousand men—mostly soldiers of the regular Army together with some CCC boys, graduate students and a few institutionalized men. In the statistical treatment of these data, the variables of age, schooling and geographical region were roughly controlled, with the intention of locating the mid-point of the Army scale at "the central tendency of the distribution of scores made by the adult white male population of military age," a target which was not missed very far, as events have proved.

On November 18, 1940, when the first selectees reached the Army Reception Centers from the Induction Stations, the Army General Classification Test, the Non-Language Examination 2 abc and the Soldiers Qualification Card, W.D., A.G.O. Form 20, had been printed and distributed, ready for use.

Since that time, one of four forms of the Army General Classification Test has been taken by approximately eight million men and the scores entered on their Qualification Cards along with data about age,

schooling, occupational experience and other items of information which bear on the question of the individual's maximum field of usefulness within the Army. About six million of these cards contain also the soldiers' scores on a test of mechanical aptitude. Half as many carry records of performance in a radiotelegraph operator aptitude test, while smaller numbers tell what the soldier has done when given a chance to take a test of clerical aptitude or to show what he could do on one or more of a variety of special qualifying tests.

The members of the committee were gratified to observe that such aids to personnel classification proved useful in the task of rapidly balancing the distribution of talents throughout the arms and services. Perhaps their chief cause for anxiety has been a tendency on the part of some officers to place undue reliance on test scores alone as indicators of ability to learn and to perform.

During 1941, a need was increasingly recognized for procedures and tests to assist in identifying soldiers with exceptional aptitudes for learning a particular military specialty such as bombardier, weather observer, combat intelligence trainee or motor vehicle maintenanceman. Suitable tests were prepared⁵ according to a pattern of development, standardization, calibration and validation which conformed with the committee's suggestions and which have proved their worth by economizing personnel and training time. In July of that year, the Air Surgeon established a psychological branch for research on selection of air personnel. Since then this branch has studied in great detail four of the military occupations: pilot, navigator, bombardier and aerial gunner.⁶

RECENT DEVELOPMENTS

Extension and improvement of the Army-wide testing program has been one of the continuing responsibilities of the personnel research staff of the Classification and Replacement Branch in the Adjutant General's Office. This group has grown from the modest beginnings already described until it consists of 21 officers and 45 civilian members of the professional staff who have the help of 51 clerical assistants and about 50 expert consultants who serve part time. They have kept the Committee on Classification of Military Personnel informed of accomplishments and of problems which they have had to face. The following paragraphs deal with problems which absorbed a good deal of attention during the past year and were discussed in detail by the committee at its eleventh meeting, May 26 and 27, 1944.

⁵ R. W. Faubion and R. M. Bellows, *Psychol. Bull.*, 39: 643-664, 1942.

⁶ John C. Flanagan, *Jour. Consult. Psychol.*, 6: 229-240, 1942.

² Walter V. Bingham, *et al.*, *SCIENCE*, 93: 572-574, 1941.

³ Walter V. Bingham, *Ann. Amer. Acad. Pol. Soc. Sci.*, 219: 18-28, 1942.

⁴ *Personnel Research in the Army*: A series of six articles by the Staff, Personnel Research Section, Adj. Gen. Office. *Psychol. Bull.*, 1943, 40, 129-135, and succeeding issues.

Psychological Screening at Induction Stations. To identify correctly all the marginally suitable selectees during a pre-induction examination is no easy matter. The aim is to admit illiterates who are bright enough to be trained in military duties while excluding literates who are so dull and slow that it is not feasible to train them to be useful soldiers. For more than a year and a half after procurement through Selective Service began to replace the traditional system of voluntary recruitment, final decisions as to mental qualifications of registrants selected by local boards for induction were made by officers in command of the induction stations, after considering any evidences of mental deficiency observed in the course of a test of literacy and in a brief interview conducted by an examining psychiatrist. Not until August 1, 1942, were psychological examinations for screening the extremely dull adopted for nation-wide use in induction stations. Thereafter, selectees whose schooling had not reached the level of high-school graduation were screened by psychologists (personnel consultant officers) who used a very brief interview and a battery of group tests, verbal and non-language, supplemented when necessary by individual examinations. For a time, limitations were imposed on the number of illiterates accepted. But, schooled in the Army's Special Training Units, most of these men picked up the indispensable minimum of proficiency in reading and figuring in from eight to twelve weeks; and on June 1, 1943, all restrictions on acceptance of illiterates were removed, provided they met the established standards of mental ability. These tests and procedures have again been thoroughly revised, the better to identify and bar out the mentally deficient while admitting bright illiterates. This new battery of induction station tests has recently been adopted after having been thoroughly validated against the practical criterion of minimum ability to perform as a soldier.

Army Basic Abilities Test. A test of wide applicability projected in 1942 to take the place of the Army General Classification Test and certain other tests as well has only now reached the final stages of standardization. Besides an overall measure of general learning ability, it yields a profile of significant measures of specific abilities, including reading and vocabulary, arithmetical reasoning, computation and space thinking.

Army Individual Test. The need for tests of mental ability for use in hospitals, detention barracks, mental hygiene clinics, special training units and discharge boards where a paper-and-pencil group test is not suitable or adequate has generally been met through the use of well-known tests and scales, supplemented by new devices and adaptations provided by F. L. Wells, David Wechsler and others. During

the past year, the Personnel Research Section has developed and validated an individual examination which has several advantages in the way of simplicity of procedures, number of subtests and amount and variety of materials the examiner has to handle. It eliminates reference to unsuitable forms of interpretation such as "Mental Age" and "Intelligence Quotient"—concepts which, no matter how valuable they are in thinking about rate of mental growth, are not suited to the expression of differences in mental ability among adults. The committee finds this Army Individual Test to be administratively workable and well adapted to military requirements, and has recommended its adoption for use in situations where a group test is inappropriate, although much remains to be ascertained as to the precise clinical significance of the total and partial scores.

Measures of Mechanical Aptitudes. The advice of the committee has been needed particularly, during the past twelve months, in connection with problems of selecting men for training in mechanical occupations, for example, airplane engine mechanic, automotive maintenanceman, armorer, radar technician and radio repairman. A question had arisen in certain military circles as to the advisability of measuring mechanical aptitudes by means of paper-and-pencil tests such as those which had been widely used for two years. "Is it not obvious," said these officers, "that a still better way of finding out about a man's mechanical ingenuity and resourcefulness is to give him a manipulative test, a gadget which he must take apart or put together?" About sixty such performance tests were, as a matter of fact, locally devised by diligent officers, most of whom were not fully aware of the necessity for rigorous experimentation and try-out to make certain that a test which looks ingenious and promising actually yields scores which are differentiating and reliable enough to be depended upon, and which are significantly related to subsequent performance. When called upon to examine these new tests, to report on their usefulness in comparison with other indicators of probable success, and to provide, if possible, still better predictors, the personnel research staff of the Adjutant General's Office asked the Committee on Classification of Military Personnel for advice and suggestions. In response to this request a subcommittee, authorized by the Division of Anthropology and Psychology of the National Research Council, was appointed and given the title, "Advisory Board on Mechanical and Technical Personnel."

The membership of this board is as follows: Dr. C. L. Shartle, *Chairman*, chief of the Division of Occupational Analysis and Manning Tables, War Manpower Commission; Dr. H. A. Edgerton, director of the Occupational Opportunity Service, Ohio State

University; Dr. J. L. Otis, director of the Personnel Research Institute, Cleveland College, Western Reserve University; Dr. Millicent Pond, Industrial Personnel Division, Army Service Forces, formerly director of Psychological Test Research, Seoville Manufacturing Company; Dr. Joseph Tiffin, professor of psychology, Purdue University.

The board held its first meetings on the second and third of July, 1943. A tour was made of Ordnance Schools and a Replacement Training Center in the Baltimore area in order to become familiar with the prevailing problems of classification, after which the board recommended that improvements in the correctness and adequacy of criterion data should be given first attention. Better ratings and evaluations by school instructors of progress made by trainees in service schools were urged. The board also called for a reduction in the number of different classification tests used in certain training centers and for introduction of simpler classification devices of known dependability.

Moving in the direction suggested, the Technical Classification Unit of the Personnel Research Section carefully ascertained the reliability of each of the more promising performance tests of mechanical aptitude which had sprung up. Few of them were found to be reliable enough to warrant serious consideration as items in a predictive battery. None was as valid as the better paper-and-pencil group tests of mechanical aptitude. As a consequence of this and related studies, twenty-five manipulative tests formerly administered in Army Air Forces Basic Training Centers in order to select personnel for technical aircraft maintenance courses were replaced by a battery of four objectively evaluated tests, only two of which are performance tests. Use of this battery has reduced substantially the proportion of failures in these courses. An estimate of savings in training costs effected by this particular study is \$57.50 for each man processed through these Basic Training Centers. Incidentally, it was no surprise to the board to find that the mechanical aptitudes required for successful completion of these training courses are sampled more accurately by means of well-constructed paper tests of space thinking and mechanical comprehension than by so-called "practical" manipulative tests, for in the latter, a man's performance tends to vary not only with his mechanical understanding and ingenuity; it is affected also to a conspicuous degree by his manual dexterity, his mere skill of hand; and such purely manual factors are of relatively trivial moment in predicting ability to learn how to adjust a propellor, to repair a balky machine gun, or to diagnose and cure an attack of engine trouble.

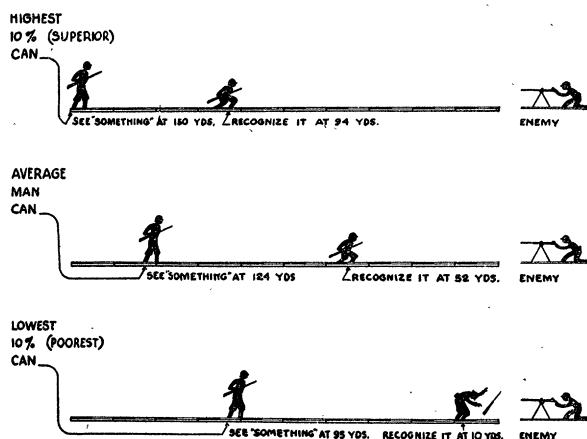
Follow-Up. At subsequent meetings on August 13 and 14, 1943, and on December 10 and 11, 1943, the board reviewed the progress that had been made and offered further suggestions. Deploing the tendency to evaluate tests solely in terms of their validity as predictors of performance in service schools, a strong recommendation was filed urging that follow-up data be secured from combat units. As a consequence, the personnel research staff has secured and studied ratings of performance of mechanics and technicians serving with airplane spotter and anti-submarine units on duty in this country, and efforts are being made to secure from foreign theaters of operations similar follow-up information.

Measures of Proficiency. Facts regarding the actual proficiency of mechanics, technicians and other specialists are indispensable for correct assignment. But estimates of such proficiency, made by classification interviewers, by instructors in specialist training courses and by assignment officers, are sometimes quite inaccurate. For this reason it has been necessary to develop objective tests of knowledge and performance in those specialties which are of the greatest importance numerically or otherwise. For example, automotive repairmen are called for in large numbers throughout the services; it is essential to know just what kinds of truck-maintenance work can be entrusted to each man. Proficiency tests have been developed for this occupation, and for other common specialties such as cook, baker, clerk, carpenter and painter; also for nearly fifty other specialties which occur less frequently but are nevertheless vital to military operations, as in the ground-crews of the Air Forces.

These tests have served several purposes. They have been employed to evaluate the proficiency obtained in service schools and by experience on the job, with a view to accurate assignment. They have been used to minimize duplication in retraining, to shorten the time required by ascertaining those items or phases of instruction which certain individuals can by-pass since they already have the prescribed skills or information. They have served to measure the rate of progress and to supply the incentive of competition. And finally, for the program of selection research, they have furnished invaluable criterion data.

Night Vision. The measurement of individual differences in dark-adaptation and the ability to see in extremely low illumination is obviously important in selecting men capable of serving on night patrols or as scouts, lookouts and drivers responsible for leading convoys of trucks during the darkest hours. (See Fig. 1.) Most of the instruments for measuring dark-adaptation have proved to be unreliable or impractical

to use under camp conditions. To meet this situation, a dark-adaptation test has been developed which meets the requirements of simplicity, practicality and reliability. It has now been twice validated in infantry and field artillery training centers against field criteria of ability to see at night. This test apparatus has, moreover, proved to have utility as a training instrument as well as for selection.



• FIG. 1. Showing differences in ability to see at night. Based on data secured on dark starlit nights from four hundred and fifty soldiers in a training center.

Personality Tests. Requests have repeatedly been received for various kinds of personality tests. Projective techniques, personal inventories and other forms of test have been in demand. They are wanted as screens to identify men who should be drawn to the attention of a psychiatrist; as aids in diagnosing maladjustments; or as measures of characteristics deemed important for success in such military occupations as paratrooper. They have been requested by induction stations, special training units, mental hygiene clinics, hospitals, convalescent wards, rehabilitation centers and reassignment depots. Psychologists called upon to testify before a discharge board or a court martial have wanted objective measures of personality with which to buttress their opinions. Instructors training embryo officers, and boards passing upon the relative suitability of applicants competing for admission to officer candidate schools have longed for yardsticks with which to measure what it takes—in addition to intelligence and physical stamina—to lead a platoon to victory in battle.

This field of personality measurement is a difficult and baffling one. Attempts have been made in several of the situations mentioned above to validate and utilize those instrumentalities which appeared to be most promising. But the outcome has generally been unsatisfactory. The test scores are seldom reliable

enough to be depended upon for individual diagnosis, or they are complicated, difficult to secure and ambiguous in interpretation. In one situation it turned out that a greater amount of dependable significant information could be obtained at less cost of time by close observation and careful proficient interviewing of the individuals in question than by giving, scoring and interpreting the proposed tests of personality. The Committee on Classification of Military Personnel has, nevertheless, recommended a continuation of current studies to determine the practicality and immediate usefulness of several tests, inventories and projective techniques so that the results may be made known throughout the Army, even though they should turn out to be disappointingly negative.

Selection of Combat Leaders. It is not difficult to measure ability to learn what is taught in officer candidate school. This is now done by means of a forty-five minute Officer Candidate Test, required of each applicant before he appears for interview by the members of a selection board. To predict his success as an instructor and disciplinarian of the soldiers in a platoon is much harder. The pay-off—his success in leading these men when he and his troops are under fire—is even harder to forecast.

Ability to maintain a clear head under conditions of extreme stress has long been recognized as one of the weighty factors in combat leadership. It is therefore not surprising that proposals for officer candidate selection tests have frequently included resort to standardized stress situations which provide for measuring the candidate's ability to maintain his self-command and to think and act sensibly in spite of intense distractions. Such methods, employed with apparent satisfaction in both the British and the German Armies, have not been favorably considered for general adoption in this country. To be sure, trial in at least one officer candidate school has given favorable results; but up to the present time it has been deemed inadvisable to extend experimentation of this sort, partly because of the likelihood of widespread misunderstanding of the use of obviously artificial stress situations; and partly because it has seemed to be feasible to reach the same goal by accumulating the facts about a candidate's achievements and behavior as observed under the real stresses that normally arise during an extended period of military training, for example, when the soldier is experiencing the excitement of his first infiltration exercise with live ammunition, or when he is being introduced to the poison gas chamber.

In the meantime, Henry E. Garrett, with the help of Ernest M. Ligon, has studied the current methods of evaluating leadership in Infantry and Field Artillery.

lery Officer Candidate Schools. He has also been able to examine ratings made upon 176 company officers (mostly lieutenants) who are graduates of the Infantry School at Fort Benning and who led their men through the stress of battle in a foreign theater of operations. These combat efficiency ratings are related—though not closely—to the leadership ratings that had been assigned to these men by their platoon instructors in Officer Candidate School. It was noted that company officers between the ages of 22 and 27 tend to be rated more efficient in combat than younger or older men. Entrance requirements for this Officer Candidate School could, it seems, be established in a way to eliminate many men who, although they could graduate, would subsequently prove to be inefficient officers. In order to define these standards precisely, however, more data are needed. And so the committee's earlier recommendations have been urgently renewed, that combat efficiency ratings be obtained upon a large number of company officers and non-coms in a theater of operations where these men have recently been leading platoons or sections under enemy fire. It seems that the study of such information in relation to the facts available about these men at the time when they were being considered for officer candidate school would now furnish the most promising approach to a solution of this difficult problem.

Separation Classification. The committee has expressed its satisfaction at the progress made since June, 1943, in improving procedures for classification and vocational counseling of personnel about to be separated. But much remains to be done before X-Day when the volume of separations will be enormous.

For example, as one aid in the training of officers to be vocational counselors, the committee has stressed the desirability of ascertaining now the facts as to the relationships between Army test scores and fields of civilian occupational specialization. It has seemed advisable to find out the spread and the central tendency of test scores in each of the more common occupations. Studies under weigh will show also the meaning of different scores in estimating the probability of educational success in trade school, high school, technical school, college and professional school, as well as in occupational specialties. This information is being obtained by tabulating data from a large sample of Qualification Cards.

It is recognized that the Army's responsibility for the vocational counseling of its personnel can be met only if certain conditions prevail. In the first place, counseling should be available at a time when the man has an appetite for it and the leisure to think through

his personal plans in the light of information which his counselor provides. It is a preparation for return to civil life. This suggests that the counseling should be initiated well in advance of the final hectic day of discharge. Moreover, counselors chosen for this assignment must have certain indispensable personal qualifications as well as the essential professional background of training and experience. The number of such officers is not great. This fact places a definite limit on the extent of any counseling program which can be undertaken.

To insure the availability of qualified counselors whenever the need for their services becomes pressing, a school has been established in connection with the Separation Center at Fort Dix. Here, five weeks of intensive instruction is given to officers and enlisted men who have the necessary personal equipment, maturity, professional background and military experience in the duties of classifying and assigning personnel. This instruction is not limited to the principles and techniques of counseling. It covers the latest authentic information about trends of occupational opportunity, surveying the prospects in agriculture, industry, government, business, trades and professions. The facts about facilities for further education are supplied; also about the civilian agencies to which a returned serviceman may turn for further guidance if desired, and for help in securing just the right job or in undertaking the most suitable course of training.

The committee and the officers with whom it has conferred are under no illusions as to the possibility of supplying any final or definite vocational counseling to men who face the transition from military to civilian status. Instead, the need has been seen for making available to soldiers who request them, some of the facts without which their first steps toward planning their subsequent careers are likely to be all too casual—facts about themselves and their abilities as well as about the situation in fields of occupation to which an adjustment must eventually be effected. In other words, the task is not immediate job placement, a civilian function. It is orientation.

In so far as the military personnel classification service succeeds in meeting this need for competent educational and occupational counseling, it will, the committee thinks, have boxed the compass of its obvious responsibilities in selecting, differentiating, distributing, reclassifying and utilizing the manpower the nation has supplied, and providing a helpful hand to citizen soldiers when, after military victory, they think about turning in their weapons to take up again the tools of industry.