

THE PSYCHOLOGICAL BULLETIN

THE USE OF INTELLIGENCE TESTS IN THE ARMY

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"The war will be won through a judicious expenditure of brain power rather than a stupendous expenditure of man power," General Crowder, in an interview quoted in the *Literary Digest*, September 14, 1918.

The Difference Between a Horde and an Army.—When Germany mobilized her army practically every man called to the colors had had two or more years of military training. In that time each man had demonstrated the type of work he was able to do and had been trained to do it. The army was already made. Each division had been organized to the last detail and supplied with its quota of trained officers, machine gunners, infantrymen, artillerymen, ammunition trains, bakers, cooks, teamsters, mechanics, chauffeurs, aviators, engineers, chemists, doctors, and labor battalions. The parts of the machine needed only to be assembled in order to begin work.

Contrast this situation with that in an American cantonment receiving each month perhaps twenty thousand men, from all walks of life, with every kind of training and experience, of all degrees of ability, and alike only in their universal ignorance of the science and art of modern warfare. Such a body of men is not an army; it is only the raw material for an army. It will only become an efficient army in proportion as each man is assigned to the kind of duty for which he is best fitted, and is trained in the performance of that duty. As long as it remains but an assembled horde, it could easily be vanquished by a trained army of a twentieth its size.

The Problem of Classification.—Before the horde can be trans-

formed into an army, two kinds of classification and selection are equally important and necessary: (1) on the basis of previous occupation, and (2) on the basis of mental ability. The former will be treated in a later chapter. The importance of selection on the basis of mental ability is enhanced by the fact that the majority of men who enter the army must be assigned to duties which have little in common with the occupations they have mastered in civil life. They must learn their new tasks from the beginning, and the speed with which they can do this will depend largely upon their intelligence. Some of these tasks require a high degree of intelligence for rapid mastery, others relatively little. Hence, the necessity of some kind of intellectual sifting. The general purpose of such sifting is two fold: (1) to aid in placing each man where his military usefulness will be greatest, and (2) to reduce the time necessary for organizing and training units.

Mental Tests for Millions.—The preceding chapter has shown us that the ideal way to bring about such a mental classification is by means of intelligence tests. Immediately after the declaration of war by the United States the President of the American Psychological Association appointed a "Committee on the Psychological Examination of Recruits." This committee decided to recommend the mental examination of every soldier, and within six weeks had prepared methods adequate for the huge task of testing millions of men.

The intelligence scale devised for the purposes embodied the following important features:

1. It permitted "group examining" so that one examiner could test several hundred men in less than an hour.
2. The procedure in giving the tests was so minutely laid down that anyone of a hundred examiners testing a group would get the same results.
3. The test questions were ingeniously arranged so that practically all could be answered without writing, by merely drawing a line, crossing out or checking.
4. By the use of scoring stencils the personal equation was entirely eliminated from the grading of papers. When the stencil is placed upon the paper it shows instantly the number of correct answers. The test papers are in fact scored by enlisted men who know nothing about psychology.
5. Coaching was guarded against by making five different "forms" of the scale, each "form" differing entirely in substance

from every other "form," yet all exactly equal in difficulty and alike psychologically.

After a preliminary trial of the tests on 4,000 soldiers they were adopted for use and further trial in four National Army Cantonments. By January, 1918, some 80,000 men and officers had been tested. An official investigation of the results in these four camps indicated such large value for the psychological work that it was ordered extended to include the testing of the entire enlisted personnel of the Army. At the same time a Division of Psychology was established in the Office of the Surgeon General, commissioned officers were provided to carry out the program, and a School of Military Psychology for the training of Psychological Officers was established at Fort Oglethorpe, Georgia. By October 1, 1918, approximately one and a half million men and officers had been tested and classified according to intelligence, and tens of thousands of assignments or promotions had been made wholly or in part on the basis of the intelligence ratings. Intelligence ratings have proven of military value in the following particulars:

1. In the discovery of men whose superior intelligence recommends their advancement.
2. In the prompt selection and assignment to Development Battalions of men who are so inferior mentally that they would retard the training of other soldiers.
3. In forming organizations of uniform mental strength where such uniformity is desired.
4. In forming organizations of superior mental strength where such superiority is demanded by the nature of the work to be performed.
5. In selecting suitable men for various army occupations or for special training in colleges or technical schools.
6. In eliminating from the army those men whose low grade intelligence renders them either a burden or a menace to the service.

Three Systems of Tests.

The general intelligence tests as used in the U. S. Army include three types.

1. *Alpha*, a group test for men who read and write English. The Alpha test measures a man's ability to comprehend, to remember and follow instructions, to discriminate between relevant and irrelevant answers to common sense questions, to combine related ideas into a logical whole, to discover by logical reasoning the plan

present in a group of abstract terms, to keep the mind directed toward a goal without yielding to suggestion, and finally, to grasp and retain miscellaneous items of information. It is so arranged that its 212 questions are answered by checking or underlining, thus permitting the answers to be scored by the use of stencils.

2. *Beta*, a group test for foreigners and illiterates. The Beta test is given to all men who cannot understand or read English well enough to take the Alpha test. Success in it does not depend upon knowledge of English, as the instructions are given entirely by pantomime and demonstration. Like Alpha, Beta measures general intelligence, but it does so through the use of concrete materials instead of by the use of written language. It measures particularly the ability to understand instructions given in pantomime, degree of foresight and ingenuity, the ability to discover a plan in given materials, the power to form arbitrary associations quickly, the ability to find likenesses and differences among printed symbols, to detect absurdities, to remember, and to combine related items into a logical whole. Like Alpha, its answers require no writing and are scored by stencils.

3. *Individual Tests*.—Three forms of individual tests are used in the examination of men who fail to pass the group tests. They are The Yerkes-Bridges Point Scale, The Stanford-Binet Scale, and The Performance Scale. The Performance Scale was devised especially for testing foreign subjects. The instructions are given by signs and demonstration, and a high score may be earned by one who does not know a word of English.

Procedure

All enlisted men are given either Alpha or Beta according to their degree of literacy. Those who fail in Alpha are given Beta, and those who fail to pass either of the group tests are given an individual test. Of whites, ordinarily about 75 per cent. receive their ratings on Alpha, about 20 per cent. on Beta, and only about 5 per cent. on an individual test. However, recommendation for rejection, discharge, or assignment to development battalion is not made on the result of a group test alone, but only after an individual test. This is a necessary precaution to prevent malingering.

Each group test takes a little less than an hour and can be given equally well to any number of men up to four or five hundred, according to available space. The individual test ordinarily takes from fifteen to thirty minutes, though in difficult cases an hour is occasionally necessary.

In all the examinations the greatest care must be taken to keep the conditions uniform, to put the men at their ease, and to encourage them to do their best. In this there is rarely any difficulty. Experience shows that the men take the test seriously but without undue nervousness. Attempts to cheat are not common.

Ratings

As a result of the tests each man is rated as A, B, C, C—, D—, D or E. The letter ratings of all the men are reported to the Personnel Office, are there copied on the qualification cards, and are then given to company commanders.

What the Letter Ratings Mean.—The rating a man earns furnishes a fairly reliable index of his ability to learn, to think quickly and accurately, to analyze a situation, to maintain a state of mental alertness, and to comprehend and follow instructions. The score is little influenced by schooling, for some of the highest records have been made by men who had never even finished the eight grades. The meaning of the mental ratings is as follows:

A. *Very Superior Intelligence.*—This grade is earned by only four or five soldiers out of a hundred. The “A” group is composed of men of marked intellectuality. “A” men are of high officer type when they are also endowed with leadership and other necessary qualities.

B. *Superior Intelligence.*—“B” intelligence is superior, but less exceptional than that represented by “A.” The rating “B” is obtained by eight to ten per cent. of soldiers. The group contains a good many men of the commissioned officer type and a large amount of men of non-commissioned officer material.

C+. *High Average Intelligence.*—This group includes about fifteen to eighteen per cent. of all soldiers and contains a large amount of non-commissioned officer material with occasionally a man whose leadership and power to command fit him for commissioned rank.

C. *Average Intelligence.*—Includes about twenty-five per cent. of soldiers. Excellent private type with a certain amount of fair non-commissioned officer material.

C—. *Low Average Intelligence.* Includes about twenty per cent. While below average intelligence, “C—” men are usually good privates and satisfactory in work of routine nature.

D. *Inferior Intelligence.*—Includes about fifteen per cent. of soldiers. “D” men are likely to be fair soldiers, but are usually slow in learning and rarely go above the rank of private. They

are short on initiative and so require more than the usual amount of supervision. Many of them are illiterate or foreign.

D— and E. *Very Inferior Intelligence*.—This group is divided into two classes (1) “D—” men, who are very inferior in intelligence but are considered fit for regular service; and (2) “E” men, those whose mental inferiority justifies their recommendation for Development Battalion, special service organization, rejection, or discharge.

The immense contrast between “A” and “D—” intelligence is shown by the fact that men of “A” intelligence have the ability to make a superior record in college or university, while “D—” men are of such inferior mentality that they are rarely able to go beyond the third or fourth grade of the elementary school, however long they attend. In fact, most “D—” and “E” men are below the “mental ages” of ten years and at best are at the border-line of mental deficiency. Most of them are of the “moron” grade of feeble-mindedness. “B” intelligence is capable of making an average record in college, “C+” intelligence can not do so well, while mentality of the “C” grade is rarely equal to high school graduation.

Evidence that the Tests Measure a Soldier's Value to the Service.—

It has been demonstrated that the intelligence ratings are very useful in indicating “soldier value.” Such evidence as the following is typical:

1. Commanding officers of ten different organizations representing various arms in a camp were asked to designate: (a) The most efficient men in the organization; (b) Men of average value; (c) Men so inferior that they were “barely able” to perform their duties.

The officers of these organizations had been with their men from six to twelve months and knew them exceptionally well. The total number of men rated was 965, about equally divided among “best,” “average,” and “poorest.” After the officers’ ratings had been made, the men were given the psychological tests. Comparison of test results with officers’ ratings showed:

(a) That in every organization except one, the average score of the “best” group was approximately *twice* as high as the average score of the “poorest” group.

(b) That of men testing below C—, 70 per cent. were classed as “poorest” and only 4.4 per cent. as “best”;

(c) That of men testing above C+, 15 per cent. were classed as “poorest” and 55.5 per cent. as “best.”

(d) That the man who tests above C+ is about fourteen times as likely to be classed "best" as the man who tests below C-.

(e) That the per cent. classed as "best" in the various letter groups increased steadily from 0 per cent. in D- to 57.7 per cent. in A, while the per cent. classed as "poorest" decreased steadily from 80 per cent. in D- to 11.5 per cent. in A.

Many investigations of this kind have been made, and always with results similar to those just quoted. Considering that the low value of a soldier may have many other causes besides inferior intelligence, such findings are very significant.

2. Where commissioned officers have been selected on the basis of trying out and "survival of the fittest" it is ordinarily found that about 80 per cent. are of the A or B grade, and only about 5 per cent. below the C+ grade. Of non-commissioned officers chosen by this method, about 75 per cent. are found to grade A, B, or C+, and only 5 per cent. below C. Moreover, there is a gradual rise in average score as we go from privates up through the ranks of privates first class, corporals, sergeants, sergeants first class, O.T.S. students, and commissioned officers. This is seen in the following table:

PER CENT. EARNING EACH LETTER RATING

Various Groups (Whites)	D or E	D	C-	C	C+	B	A	A and B
8,819 commissioned officers	0.0	0.01	.25	2.92	13.8	34.6	48.4	83.
9,240 O.T.C. candidates..	0.0	0.14	.98	6.16	19.5	36.4	36.8	73.2
3,393 sergeants.....	0.0	1.05	4.05	14.2	27.3	32.5	20.9	53.4
4,023 corporals....	0.0	1.33	7.33	20.33	31.3	26.	13.7	39.7
81,114 literate privates...	0.22	10.24	21.48	28.79	20.48	12.38	6.37	18.75
10,803 illiterate privates..	7.8	41.16	29.11	14.67	4.43	1.95	.52	2.47

3. Experience shows that "D" students admitted to Officers' Training Schools almost never make good, and that the per cent. of elimination among the "C-" and "C" students is several times as high as among "A" students. For example, in one of the Fourth Officers' Training Schools 100 per cent. of the "D" men were eliminated as unsatisfactory, 55 per cent. of the "C-" men, 14.8 per cent. of the "B" men, but only 2.7 per cent. of the "A" men. In another Fourth Officers' Training School 76.2 per cent. of the men rating below C were eliminated in the first six weeks, 51.5 per cent. of the "C" men, and none at all of the "A" or "B" men. These findings are typical.

The psychological ratings are valuable not so much because they make a better classification than would come about in the course of

time through natural selection, but chiefly because they greatly abbreviate this process by indicating *immediately* the groups in which suitable officer material will be found, and at the same time those men whose mental inferiority warrants their elimination from regular units in order to prevent the retardation of training. Speed counts in a war that is costing our country over fifty million dollars per day.

Directions for the Use of Intelligence Ratings.—The following instructions for the use of the intelligence ratings have been issued to the Personnel Adjutant of each camp:

1. The mental tests are not intended to replace other methods of judging a man's value to the service. It would be a mistake to assume that they tell us infallibly what kind of soldier a man will make. They merely *help* to do this by measuring one important element in a soldier's equipment; namely, intelligence. They do not measure loyalty, bravery, power to command, or the emotional traits that make a man "carry on." However, in the long run these qualities are far more likely to be found in men of superior intelligence than in men who are intellectually inferior. Intelligence is perhaps the most important *single* factor in soldier efficiency.

2. Commissioned officer material is found chiefly in the A and B groups, although of course not all high score men have the other qualifications necessary for officers. Men below C+ should not be accepted as students in Officers' Training Schools unless they are known to have exceptional power of leadership and ability to command.

3. Since more than one fourth of enlisted men rate as high as C+, there is rarely justification for going below this grade in choosing non-commissioned officers. This is especially the case in view of the likelihood of promotion from non-commissioned to commissioned rank. Even apart from considerations of promotion, it is desirable to avoid the appointment of mentally inferior men (below C) as non-commissioned officers. Several careful studies have shown that "C—" and "D" sergeants and corporals are extremely likely to be found unsatisfactory. The fact that a few make good does not justify the risk taken in their appointment.

4. Men below C+ are rarely equal to complicated paper work.

5. In selecting men for tasks of special responsibility the preference should be given to those of highest intelligence rating *who also have the other necessary qualifications*. If they make good they should be kept on the work or promoted; if they fail they should be replaced by men next on the list.

To aid in selecting men for occupational assignment, extensive data have been gathered on the range of intelligence scores found in various occupations. This material has been placed in the hands of the Personnel Adjutants for use in making assignments. It is suggested that as a rule, a man should not be assigned to an important army occupation unless his intelligence rating is as high as the average for all men in that occupation.

6. In making assignments from the Depot Brigade to permanent organizations it is important to give each unit its proportion of superior, average, and inferior men. If this matter is left to chance there will inevitably be "weak links" in the army chain.

Exception to this rule should be made in favor of certain arms of the service which require more than the ordinary number of mentally superior men; *e. g.*, Signal Corps, Machine Gun, Field Artillery and Engineers. These organizations ordinarily have about twice the usual proportion of "A" and "B" men and very much less than the usual proportion of "D" and "D—" men.

7. "D" and "D—" men are rarely suited for tasks which require special skill, resourcefulness or sustained alertness. It is also unsafe to expect "D," "D—" or "E" men to read or understand written directions.

8. Only high score men should be selected for tasks that require quick learning or rapid adjustments.

9. It should not be supposed that men who receive the same mental rating are necessarily of equal soldier worth. *A man's value to the service should not be judged by his intelligence alone.*

10. It is one of the most important functions of the psychological tests to aid the Personnel Office in the rapid sorting of the masses of men in the Depot Brigade. *In no previous war has so much depended on the prompt and complete utilization of the mental ability of the individual soldier.* It is expected, therefore, that the psychological ratings will be regularly used as an aid in the selection, assignment, and classification of men.

PROBLEMS

1. Has there ever been another war in which so much depended on the prompt and complete utilization of the intelligence of the individual soldier?

2. Does it seem unreasonable to believe that the best possible use of every soldier's ability might hasten by several months the country's attainment of maximum military efficiency? Assuming

for a basis of discussion that it would make a difference of three months, indicate the possible value of such a saving of time in terms of war costs and chances of making the victory complete.

3. In view of the fact that one fourth of the privates in an average unit test as high as C+, B, or A, what would be the probable effect of having 40 per cent. of the non-commissioned officers of a grade below C? (An actual situation.)

4. What are the relative values of the following qualities in an officer's equipment:

Muscular strength and agility;

Size;

Physical bearing;

Voice;

Leadership;

Character;

Intelligence.

Which of the first six traits are most likely to be associated with superior intelligence?

5. A camp Personnel Officer is asked to supply 100 auto mechanics. Examination of the files of the Qualification Cards shows that there are 360 men in the camp classified as auto mechanics, with intelligence ratings as follows:

D-	D	C-	C	C+	B	A
4	21	53	98	107	58	17

How would you select the men for assignment? (Personnel Adjutants are constantly faced with such problems in selecting men for army occupations.)

6. Show the value of a certain amount of leveling up of units. Suppose the defense of an important sector has been entrusted to a regiment which is made up largely of "D" and "D-" men. What would probably happen in case of an offensive by the enemy?

How would you treat such inequalities in mental strength as are shown in the following "best" and "poorest" companies of a Depot Brigade?

	D- or E	D	C-	C	C+	B	A
Best	0%	4%	5%	21%	28%	26%	16%
Poorest	4%	19%	18%	29%	19%	9%	2%
	Best		Poorest				
Grades below C-,	4%		23%				
Grades above C+,	42%		11%				

7. Is it fair to judge a company commander entirely by the results he gets? How would this rule work in the two companies mentioned above?

8. Show various ways in which a feeble-minded soldier may be a burden to the service and a menace to his fellows.

9. Of 1,059,767 soldiers who were given a psychological examination between May 1 and September 1, 1918, 16,266 had a "mental age" of 8 years or less, and 7,359 a "mental age" below 7 years. Many men of this grade of mentality are so nearly normal in appearance that without an intelligence test, their mental deficiency would long escape detection. Try to estimate the total menace this many feeble-minded soldiers would constitute.

10. Assume that it costs \$2,500 to induct a soldier into the service, equip him, train him for eight months, and send him overseas; assume also that if he must then be returned as unfit, the government will be put to a further expense of \$2,500 in sending him home, mustering him out, and meeting insurance or pension obligation until his case is closed. On this basis, compute the money wasted by accepting 10,000 soldiers too inferior mentally to be used. Compare the total with the cost of giving intelligence tests to a million recruits at 25 cents per man.

HOW THE ARMY USES INDIVIDUAL DIFFERENCES IN EXPERIENCE¹

BY VARIOUS MEMBERS OF THE COMMITTEE ON THE CLASSIFICATION OF PERSONNEL IN THE ARMY.

The Headquarters Company of a 3-inch Field Artillery Regiment contains 187 enlisted men. Twenty-six of these are privates, first class. They are listed in Tables of Organization as follows: 1 in charge Regimental Commander's Scissors Instrument, 3 telephone operators, 9 scouts, 9 radio operators, 3 chauffeurs, 2 operators Battalion Commander's Scissors Instrument, 2 signalers.

An analysis of the work that these privates, first class, have to do shows that the first one must have had some experience as a draftsman, principally as a detailer; the next three must have had some experience in repairing telephone switchboards and be able to operate such a switchboard; three of the nine scouts must have

¹Outlines of the Study of Human Action for the Students' Army Training Corps, Section 2.