

ACADEMIC ACHIEVEMENT AND ARMY QUALIFICATION TEST SCORES  
COMPARED ON A BASIS OF EIGHT THOUSAND CASES

by

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ACADEMIC ACHIEVEMENT AND ARMY QUALIFICATION TEST SCORES  
COMPARED ON THE BASIS OF EIGHT THOUSAND CASES

INTRODUCTION

Over the past few years, this country has become acutely aware of shortages, not only in raw materials but in human resources. The steady growth of the economy, plus the addition of a major defense program to the requirements of civilian production, forced a nation which previously thought itself well supplied to allocate a number of basic resources in order to have enough to go around for even its most essential uses.

At the same time that the shortages of raw materials became apparent, shortages of manpower were felt--shortages of young men for military service, shortages of specialists in science, in medicine, in engineering, and along the main production lines of industry. There were shortages in numbers, both in relation to the needs of the country and the free world and in comparison with the numbers on the totalitarian side; and shortages in skills. Such problems can not be overcome quickly. Such problems require time and study and an acute awareness of the situations which face us.

The United States is the largest and most powerful, economically and militarily, of the nations of the free world. Yet, with 160 million people, it is some 40 million short of being able to match, man for man, the numbers of the Soviet Union. Only as it fully uses the native ability of its people, offering them the opportunity to do their best and providing top training and equipment, can the advantage of the totalitarian world in number be offset and compensated for by an advantage in skills sufficient to assure maintenance of a free society (17, pp.1-2).

From the beginning of this country, the offer of opportunity to the individual has been recognized as a key obligation of democracy (17, p.3). But until quite recently the existence of a chance to realize the highest attainment of which each citizen is capable has been thought of chiefly as an individual good, as part of every man's right to life, liberty, and the pursuit of happiness. Today, the importance attached to the opportunity for the individual is enhanced by the sober reflection that the continuance of the pursuit of happiness depends upon the provision for the common defense.

The full mobilization which occurred during World War II and the partial mobilization which was experienced during the Korean hostilities have precipitated new policies with respect to our national manpower resources, primarily the

use of compulsion for the screening and selection of men for the Armed Forces. As a by product of this screening process for securing manpower, a large amount of information was obtained about every individual called for examination.

This information is relevant for assessing the qualities and capacities of an important sector of the population for meeting the requirements of industry and the obligations of citizenship. The information obtained was determined by the type of tests used by the military services. The range and number of disabilities uncovered by the examinations were, however, reflections of pre-existing conditions; the examination merely brought them to the surface.

Illiteracy, one of these conditions, is defined by the dictionary as "an inability to read and write." This is a sweeping definition and it should be interpreted to mean an inability to read and write in the language of the country in which one is residing. A man might be able to read or write in German, French, Spanish, yet if he were residing in this country and had not acquired reading and writing skill for the basic usage of English, he would be considered as illiterate, at least on the Armed Forces Qualification Test.

Education is preparation for life, for work, and for

citizenship, including military service. The ability of an individual to manage his life, to play a productive part in the community, in peace and war, are all influenced considerably by the extent to which he has been exposed to and has absorbed the advantages of an education.

It is fully realized that in dealing with a subject with as many and as varied facets as this one has, it is necessary to limit the field and also the approach to such a study. With these thoughts well in mind, "Academic Achievement and Army Qualification Test Scores Compared on the Basis of Eight Thousand Cases" has been selected as the field study for this thesis.

In presenting a statistical study such as this one, it is well to have in mind this thought of F. M. Urban: "Keep close to experience; add as little of your own as possible; if you have to add something, be mindful to give an account of every step you take." (13, p.1)

### Problem and Objectives

The primary purpose of this study is to determine what effect academic achievement has on Armed Forces Qualification Test scores. Questions to be discussed and which also serve as chapter headings are:

For what purposes does the Army give a mental test?

Just what is this Test?

Of what does it consist?



Is the Armed Forces Qualification Test valid?

What effect does academic achievement have on Armed Forces Qualification Test scores?

Other items to be covered in this presentation and which are also used as chapter headings are as follows:

How does Oregon compare with the rest of the Nation in Armed Forces Qualification Test results?

Is there a significance between physical and mental rejections?

What is the Non-Language Test?

Objectives which this study hopes to accomplish are:

1. To deepen the knowledge of human resources as reflected by these tests.
2. To show the necessity for the conservation of human resources.
3. To present possible steps which might be taken toward a more complete utilization of these human resources than exist at the present time.

### Sources of Material

Personal association with the procurement of military manpower for many years and a great deal of experience--first-hand knowledge related thereto--has been used as a primary source of material for this study. Indirectly, personal experiences from the teaching field and from industrial personnel work have also been utilized in this presentation. Statistical material has been obtained from a survey of 8089 cases of Enlistees and Selectees with

which there has been personal observation and contact.

Other sources of reference have been the following: The Uneducated by Eli Ginzberg and Douglas W. Bray, a research project in the Conservation of Human Resources, done by the Graduate School of Business, Columbia University (12), "Manpower, the Nation's First Resource," a publication by the National Planning Association (17), "Educational Differences Among the States," a survey made by the National Education Association (15); Fundamental Statistics in Psychology and Education by J. P. Guilford (13), and current periodical material dealing with the Armed Forces Qualification Test.

#### Methods of Procedure

All of the 8089 cases were secured by random sampling of both Enlistees and Selective Service Registrants.

Sampling by group and by test is as follows:

Armed Forces Qualification Test 1 (Selective Service)	3125
Armed Forces Qualification Test 2 (Selective Service)	2947
Armed Forces Qualification Test 1 (Enlistees)	1077
Armed Forces Qualification Test 2 (Enlistees)	940
Total	<u>8089</u>

Selective Service Registrants and Enlistees were separated because of the motivation factor; Enlistees appear voluntarily, Selective Service Registrants appear because they are required to do so.

Adequate presentation of this matter requires treatment on a national level rather than on a local or regional level. Personal interest and close association with this problem dates from the beginning of the Korean conflict; yet it will be necessary to tie in the present situation with conditions and problems indicated in World War II.

Tables will show the breakdown of tests by groups of Selectees or Enlistees, either by age, by grade of school completed or by percentile distribution. Means and deviation for each group will be shown, and the detailed steps of procedure for securing them. Correlation between academic achievement and grade of school completed will be presented and the detailed steps of securing a Pearson Product Moment Coefficient from a scatter-diagram.

It is hoped that the results obtained from this study will answer the question whether the men who fail the Armed Forces Qualification Test are mentally deficient, or if the term educationally deprived would be a more fitting classification for them.

## FOR WHAT PURPOSES DOES THE ARMY GIVE A MENTAL TEST?

A test may be defined as a systematic procedure for comparing the behavior of two or more persons. This is a broad definition, broader than used by most writers. The layman is likely to think of a test as a series of questions (8, p.II) requiring a written or oral answer. Psychological tests, however, are extremely varied, and the range of stimuli adapted to testing is constantly growing (8, p.11).

The procedure of giving tests is not entirely new to the Army. The impetus for the development of group tests was furnished in 1917 by the pressing need of testing over one and one-half million men in the United States Army during World War I. A quick, rough classification in respect to intelligence was necessary for many purposes. Discharge because of serious mental defect, assignment to labor battalions requiring only low-grade work, admittance to officers training camps, and a number of similar problems required a knowledge of the intellectual level of the soldier (1, p.18).

In one of the major achievements of practical psychology a group including Lewis M. Terman, Robert M. Yerkes and W. V. Bingham assembled (on the basis of test materials provided by A. S. Otis) a test which after experimental revision, became famous as the Army Alpha.

Alpha was a test of ability to follow directions,

simple reasoning, arithmetic and information. It was a practical test, easily administered and highly useful to the Army. It convinced people that adequate prediction of human success could be made by mass processing, so that following the war schools and industry demanded tests of this type (8, pp.104-105).

The earliest recorded evidence of a military manpower selection problem that can be recalled appears in the Old Testament, Chapter 6-8 of the Book of Judges. There it is recorded that Gideon was called upon by God to raise an Army to smite the Midianites. Gideon responded by raising an Army of 32,000 men, but the Lord told him that it was too large and its success would be impaired by the cowards within the ranks. So Gideon told all those who were afraid to fight the Midianites to go home. He was left with 10,000 men. This may be regarded as the first use of the personal interview or personal preference as a screening procedure (10, p.209).

The Lord then told Gideon that his Army was still too large and he devised a performance test to screen out those recruits who were most alert to their soldierly duties. To this end, Gideon led his men to the river for a drink, where he eliminated all those who carelessly threw down their shields and spears and lapped up water like dogs with their backs to a possible enemy. He retained only 300 men who

kept a wary eye on the bushes and with spear held ready in one hand, while they scooped up a hasty gulp of water with the other. This ingenious psychological performance test was proclaimed a success because the Midianite camp was duly liquidated in the night when Gideon's 300 men smashed their pitchers, revealed their circle of lights, blew their trumpets, and rushed upon the unsuspecting sleepers (10, p.209).

One can not vouch for the accuracy of the story as it has been related, but one can point out that the experiment lacked a control. There is no proof that the well-hydrated men who drank on their knees would not have killed more of the enemy than the more cautious selectees. Perhaps that is why Gideon's divinely inspired test is no longer used.

There seems to be a great deal of surprise on the part of the population generally when the newspapers and the magazines carry articles to the effect that low intelligence or aptitude bars more young men from military service than all physical defects together. Yet that comparison has to be put into focus. It refers specifically to failures on the so-called "Armed Forces Qualification Test" which measures ability to read, to understand words and meanings, to work arithmetic problems, to perform feats of reasoning and to do various other things (23, p.31). Why do the Armed Services have to be so particular? Why does a man

have to pass a mental test?

Today's Army is a large team working as a unit. This large team is made up of a series of small teams, and each of these smaller teams is made up of men who depend on one another to do their particular jobs.

In the modern Army there are more than five hundred different types of assignments. As the needs of the Army change, new assignments are developed. Each assignment varies as to the amount of skill, abilities and training required, and for each assignment the best man must be found. There must be no wasting of skills by mismanagement, for the manpower barrel is not bottomless. It is of vital importance to place in every assignment men who are physically, emotionally and mentally qualified to do the required work. Men in jobs too big or too small produce a low morale, poor physical and mental health, and a decrease in efficiency. These things are often paid for in human lives.

The men who are recruited or inducted by the Army have different combinations of skills and abilities. They differ in the rate at which they can learn and the amount of skill they are able to acquire. The differences exist in their capacity to add or to spell, to think and reason. There are men who can organize and plan, and men who have skill and strength in their hands. Each man must be put

in the assignment for which he is best suited.

This selection of men for proper assignments could be accomplished by trial and error--by simply trying men out in jobs until the correct assignment is found. Such a system would waste training, money, and most of all time. It is impossible to tell by looking at a man whether or not he can learn to do a certain job, or, if he can, how long it will take to train him. It is unreliable to depend on questioning people as to what they are capable of doing, since a person's memory or even his knowledge of himself is not always complete. Because all the abilities and aptitudes that people possess can not be detected by appearance and conversation, they might be overlooked in selection and assignment of men to Army jobs.

The big problem then becomes one of discovering which men are best suited for which Army jobs, and of doing it quickly. Discovering which men are least suited for specific jobs or groups of jobs is equally important so that time and money will not be wasted. To do the job of measuring skills and abilities, scientific tools have been developed. These tools are psychological tests. By means of these tests, it is possible to get an indicative measurement of abilities and often to discover hidden potentialities unknown to the person himself.

Modern science looks to the men themselves, rather



than to extraneous characteristics. As has already been pointed out, it is not practical to observe the men directly on the job in order to discover whether or not they possess the requisite abilities. They must be evaluated by indirect observation on the basis of which it is possible to predict performance. One method employed by the Army is to evaluate the previous occupational and educational history of the men since what one has done is a clue to what may be expected. Interviews and personal history questionnaires, therefore, have a part in the assignment procedure. But they are seriously limited by the fact that they are time consuming and lacking in complete objectivity. The examiner may fool himself and the examinee may fool him. Moreover, questionnaires and interviews lack precision, not only because military assignments differ from civilian occupations, but also because they can not result in dependable comparisons between man and man, nor provide the exact data required for prediction. Therefore, it is necessary to sample the performance of soldiers by tests--devices which measure and predict in a truly scientific fashion.

Indirect observation means that the thing being determined is measured by noting its effect on some other quality that can be observed. When temperature is measured with a thermometer, the temperature itself is not actually

seen, but the effect that the temperature has on moving a column of mercury up or down in a tube on which there is a scale. Similarly, when mental ability is measured with a test, the ability is not directly measured, but performance that is indicative of mental ability.

Modern society requires trained people. It needs them throughout the range of training and capacity. During World War II, more than 700,000 young men, the equivalent of 40 divisions, were rejected for military service because they were adjudged mentally deficient. During the first year of the Korean conflict 300,000 men were rejected for the same reason (17, p.9). The Armed Forces qualification Test is given to all Selectees and Enlistees. Men who fall in the percentile range 1-9 are rejected for military service on the grounds that they are mentally deficient. These men are considered to be lacking the basic education which is necessary to serve in an Army where the ability to read written orders, signs, and instructional materials is part of a soldier's necessary equipment.

The highest white rejection rates during World War II were centered in five regions: the Appalachian Mountains, the Ozarks, those counties bordering the Gulf of Mexico, those bordering the Rio Grande, and the northern parts of Arizona and New Mexico. Latin Americans and Indians, being non-Negro, are counted among the white population, which

helps to explain the high rejection rates of whites. Other areas having high rejection rates were in the northern parts of Maine, New Hampshire, and Vermont. This probably can be explained by the large number of French Canadians resident there and their inability to read and understand English (12, pp.44-45).

The regions mentioned in the paragraph above also appeared to run high rejection rates during the Korean conflict, although figures in support of this statement are not now available.

A further lesson learned from World War I is that many of the poorly educated men created a serious problem for the Army. During the latter months of the war and the early months of demobilization, psychological examiners had to report about 8000 men for discharge because of mental inferiority. Another 10,000 were recommended for assignment to labor battalions because of low-grade intelligence. Another 10,000 were assigned to "development battalions in order that they might be carefully observed and given preliminary training to discover, if possible, ways of using them in the Army." During this same period men were tested and found to be below "ten years mental age." In the opinion of Army psychologists, it was extremely doubtful that many of these individuals were worth what it cost the Government to maintain, equip, and train them for

military service (12, p.63).

Had screening tests such as the Armed Forces Qualification Test been in use at that time, many of these men could have been rejected at the Induction Station.

During 1940 and early 1941 the Army accepted persons as long as they could understand "simple orders given in the English language." But in contrast to peacetime, the Army was faced with a serious challenge during mobilization. Men had to be trained quickly so that a maximum number could be battle ready in the shortest possible time. The Army discovered that a great many trainees were finding it difficult to keep up with the training schedules. In May 1941, the Army placed a new policy into effect: "No registrant in the Continental United States will be inducted into the military service who does not have the capacity for reading and writing the English language as commonly prescribed for the fourth grade in grammar school." All registrants who had not completed the fourth grade were to be examined prior to induction by tests prescribed by the War Department (12, p.64).

Again the advantages of using a screening test at the Induction Station is emphasized. It is important that all men in the Service have a mental ceiling that will enable them to comprehend and understand basic information and instructions.

The highest rejection rates in the entire country during World War II were found in the area of northern Arizona, New Mexico, and southern Colorado, which, together with the southern part of Utah, is the home of the Navajos. Again, the lack of the ability to read and write was the major factor contributing to this situation.

At the start of the Korean conflict, the Armed Services, particularly the Army, had to expand very rapidly without knowing whether this was a build up to an all out mobilization. In situations of this kind, especially, it is desirable for the Armed Services to secure the type of man who can not only be rapidly converted into a soldier, but also has the capacities for becoming a cadre-man (12, p.204).

The dictionary defines "cadre" as "the frame of reference or framework around which a regiment or smaller military unit is formed." In the military sense "cadre" consists of Commissioned Officers, generally Junior Grade Officers, and Non-Commissioned Officers. These men are the core around which the organization is built for the training of the recruits. Men who would fit into the "cadre classification" would be Platoon Leaders, Squad Leaders, Section Heads, and Instructors.

The securing of men who have potential cadre abilities becomes an important consideration in any partial or full

mobilization plan, and again places emphasis on the weeding out of those in the 1-9 percentile.

Perhaps the idea of the above paragraph can be presented more clearly in a statement from a speech by General J. Lawton Collins on December 15, 1952: "Second-class manpower has never made a first-class Army, and we do not entrust our American youth and our Nation's security to second-raters" (7, p.34).

JUST WHAT IS THIS TEST?  
OF WHAT DOES IT CONSIST?

The Armed Forces Qualification Test-1 and the alternate form, the Armed Forces Qualification Test-2 are pencil and paper multiple-choice tests. Both forms of the test are objective.

Objective means the result obtained is almost completely independent of the person doing the measurement. Opposite to objective is subjective. Experience shows that subjective estimates and judgments are influenced by many factors that have to do with the observer rather than the thing observed. Something may feel warm or cool depending upon the observer's own temperature or upon his experience, expectations, desires, suggestibility, prejudices, or a number of other irrelevant factors. The thermometer (a scientific measuring device) has no personal bias. It will yield the same result to all observers providing only that they can read it properly.

In objective tests, the examinee has the right answer before him at all time--all he has to do is to make identification from several alternative choices. Having only one right answer, the scoring of the question can not be influenced by the observer (or grader); the examinee knows the question or he doesn't know it.

Multiple-choice questions are used in this particular

test. The question is asked in very simple language. There are four possible answers. The examinee's problem is to mark down the right answer. The letters a, b, c, and d are used to label each one of the four multiple choices. On a special answer sheet after each question number are four pairs of dotted lines. Each pair of dotted lines is labeled a, b, c, or d. If the examinee believes that choice "c" is the correct answer to question number 1, then he will fill in with a heavy black mark the two dotted lines labeled "c" on the answer sheet after the number.

Multiple choice items are used in the Armed Forces Qualification Test for the following reasons: scoring is more objective because the right answer is already set down and is neither arguable nor subject to the varying judgements of the observer. The examinee has only to recognize the answer, and is not burdened by having to search for it in his mind and then phrase it in his own way. Because the examinee does not have to write, having merely to check the correct answer, he can cover many multiple choice items in a given time. In large testing operations, multiple choice items can be scored by machine, which increases accuracy and saves time.

Three kinds of questions are included in the test. One kind is arithmetic reasoning, none of the questions



are beyond the eighth grade in difficulty. Some of the questions test knowledge of words. And there are questions that measure the ability to sense spatial relations. This is measured, for example, when a drawing shows the surface of a construction of irregular form built of blocks. The candidate is asked to count how many blocks were used to build the form. Ability to do this has been found to be a good index to ability in certain occupations such as that of automobile mechanic (3, p.211).

In the first three months of the Korean conflict there was a great deal of concern over the high number of rejectees. Part of this was no doubt high-lighted by magazine articles with such captions as "Why 6 out of 10 fail Army Tests." A mental test called the Armed Forces Qualification Test culled out 15 of every 100 Selectees. The result was that only 40 men out of every 100 draftees met the new Army standards. The 40 men had to pass a mental test that many high school students would find difficult (25, p.18).

This fact caused a great deal of controversy. Congressmen and draft officials were especially concerned by the rejection of men who had failed the new mental test. Examples of questions from one version of this test give you a chance to judge how hard the test is:

How far will a car travel in 30 minutes, if it goes

60 miles an hour?

- |              |              |
|--------------|--------------|
| (a) 20 Miles | (c) 30 Miles |
| (b) 40 Miles | (d) 25 Miles |

The Selectee was expected to select the right answer from the four choices.

Another question to test language ability was like this:

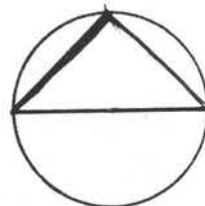
Eight people were packed in the room. (Magazine note:

This sentence means that the people were:)

- |                     |                       |
|---------------------|-----------------------|
| (a) thrown together | (c) lying down        |
| (b) crowded         | (d) lined up in a row |

The Draftee picked the choice of words among the four possibilities that explained the sentence.

A third question presented the drawing shown. The Draftee had to pick a duplicate of the drawing from among a group of various geometric shapes. There are 90 questions of this general nature in the complete test. It comprises a 16 page pamphlet. Selectees take the test in a group at the Induction Station (25, p.18).



Learning is at least as important in these tests as intelligence. Those who sharply criticize the test state that the differences which show up in the test are a reflection of educational achievements more than anything else (23, p.31). Test results and educational achievement

will be discussed in a later chapter of this thesis.

From a personal viewpoint, this test serves notice on the Enlistee and the Selectee that as prerequisite to their military training the three R's are much more important than the ability to distinguish their left foot from their right (4, p.348).

From a practical standpoint, the Army is interested that its men have (12, pp.69-70):

At least a fourth grade reading ability; they are able to understand bulletins, written orders and directives.

Sufficient language skill to understand oral and written language necessary for getting along with the officers and men.

To understand their pay accounts, to comprehend their laundry bills, to conduct their business at the PX (Post Exchange), and to handle themselves in other situations requiring a skill in simple arithmetic in a competent manner.

To understand in a general way why they are in the Service, and in time of war to understand why it is necessary for this country to fight.

With these overall objectives in mind, particular care was exercised in the selection of questions for this test. As stated earlier, the test includes vocabulary, arithmetic reasoning, spatial relationships. All three of these items are related to everyday living. Extreme care was exerted to avoid anything which would be academic or abstruse. Speed was minimized in the test, a difficulty range was obtained by a fine discrimination in content; peakability,

a progressive moving from the simple to the more difficult items in all three phases of the test, vocabulary, arithmetic reasoning, and spatial relationships.

The vocabulary items were of two types: association and effective tone. An example of association is as follows: A baby tries to manipulate anything he sees. (choose one):

(a) chew, (b) feel, (c) handle, (d) touch.

An example of an effective tone is as follows: He is sick. (choose one):

(a) hurt, (b) pale, (c) ill, (d) sad.

In the arithmetic reasoning items the attempt was made to keep verbal and computational components at a minimum so as to emphasize the reasoning aspects of the items. The verbal element was simplified by using words rated as frequently used according to the Thorndike list. Computation was reduced by using the ordinary range of number combinations and common fractions to such an extent that most items could be solved mentally.

Seven types of arithmetic reasoning items were employed in the test. They were: fundamental processes (whole numbers), number concept (indication of process, not computation), estimation (selection of closest rather than exact answer), fractions (all processes), ratio (proportion), percentage (all cases), and mensuration (use

of various systems of weights and measures).

In spatial relation items, a wide range of material was covered by using two and three dimensions. Several series of varying types of spatial items were constructed which embodied the identification of simple objects (concrete and abstract), folding and unfolding patterns and forms (solids and cut-outs), and construction of wholes from part or parts from wholes.

The test consists of 90 questions, 30 each for vocabulary, arithmetic reasoning and spatial relationships.

## IS THE ARMED FORCES QUALIFICATION TEST VALID?

What does validity mean? Validity means that the measure is meaningful in the sense that it can be interpreted correctly and usefully by any trained person. Any given reading on a good instrument will always mean the same thing because it is higher or lower or more or less than a standard reference of "bench mark" on a scale which is also standardized. On the centigrade thermometer, for example, any obtained reading can be interpreted by reference to the temperature at which water freezes and the temperature at which it boils. This is possible because the thermometer is scaled to these two "reference points" which are definite and independent of the measuring instrument. In contrast such subjective estimates as "fairly cool" or "very cool" are merely personal opinions which may mean quite different things to different people and are therefore of little use in measurement.

Validity in a test means that the test should "measure what it is supposed to measure." In other words, those men who score high on a test should be successful in a course of instruction and those men who score low on a test should fail in a course of instruction.

In a screening test, it would be an indication, a prediction of a man's ability in respect to his mental

equipment to meet the basic requirements of military service.

At this time it would be well to also consider that very important factor reliability. No measuring instrument, scientific or otherwise, will produce results with perfect consistency. Even a series of successive measurements of a wooden plank will contain variations. But for satisfactory carpentry, any one of these estimates is close enough to be considered the true length. If any two measurements should differ by as much as a few inches, the carpenter would sooner conclude that he was measuring different planks than he would suspect the constancy of his measuring tape. Psychological measurement is not so consistent as this; the plank is not so variable as the men. Yet the estimates of the talents of the men obtained with the use of Army tests are sufficiently close to their "true" measure to be employed with confidence for the classification purposes for which they are designed.

Reliability in a psychological measurement means that the test should measure what it is supposed to measure with consistency. What a man receives as a score on a test should be a true measure of his real ability; so that, if he should take a test several times, each of the scores at different times should approximate one another in value.

In connection with the above definitions, it is

interesting to note a statement of comment made by an expert making a special study of men rejected for military service in the state of North Carolina:

"The test the Army is using is not a mental test at all. It is an achievement test because the whole test is based on the ability to read. This does not measure the mental ability of an individual unless he can read."  
(12, p.206).

While the statement has value, yet as it was earlier pointed out this test has as one of its objectives the elimination or rejection of those men with less than a fourth grade reading ability. The Army regards a fourth grade reading ability as the minimum mental ability with which a man can handle himself satisfactorily in the service.

The Army will use any test, which is deemed necessary for its purposes, if it has a reliability of point eighty (.80). This refers to the reliability coefficient. The Army General Classification Test used in World War II had a reliability of point ninety-five (.95). In a sampling of some 4000 the AFQT had a correlation with the AGCT of something over point ninety-one (.91).

Back in 1950, this AFQT was criticized by Major General Lewis B. Hershey, head of Selective Service, as failing too many men. It was doing just what it was



designed to do Army records indicated (3, p.211).

The test was designed to keep out of the Army those men who are so stupid or ignorant that they would do the Army more harm than the enemy itself. Difficulty of the test was so planned as to disqualify 13 percent of the men of draft age. It is just that portion of the population that is too low in intelligence or education to make good soldiers, Army figures indicated (3, p.211).

Actual rejections during the month of July 1950, for failure on the mental test amounted to 15.2 percent, a figure slightly higher than the expected 13 percent. But the drafted men sent to the Army were not representative of the whole population. Screened out were those who had enlisted in the Navy or the Air Force, all veterans, all college boys who were in the upper 50 percent of their classes, and all ROTC students. Yet it is interesting to note that at the end of June 1951 (July 1, 1950 to June 30, 1951) the percentage of rejections was 16.4 percent (15, p.10).

In 1953 a publication carried General Hershey's statement to the effect that of the million and a half (1,520,905) Selective Service Registrants examined during the first year of the Korean conflict, 535,624 or 35.2 percent failed to qualify for military service. The most significant disqualifying cause was the failure to pass the

Armed Forces Qualification Test. For nearly 300,000 men or 19 percent of those examined this was the principal cause of rejection (2, p.12).

Passing mark on the test was not set by the Army; it was set by Congress in the Selective Service Act of 1948, where it provided that the Army should accept all men who made a score better than 70 on the old Army General Classification Test. (A standard score of 70 on the old AGCT was the same thing as a percentile score of 13 on the AFQT. In December 1951, the cutoff point was lowered to an AGCT score of 65 and an AFQT percentile score of 10.)

By giving the then new all Services test (AFQT) to 12,000 men who had also taken the old AGCT, an equivalent on the new test for the grade 70 on the old one was found. That was the cutoff point (3, p.211).

The new AFQT was put into operation in January of 1950, and was the answer to a demand that all the Armed Forces have a single scale for measuring the talents of their men. It was prepared by experts from the Personnel Research Section of the Army and from equivalent offices in the Navy, Air Force, Marine Corps, and Coast Guard. Practially all the experts who worked on the test had seen service during World War II; the rest had been civilian employees of the Armed Forces during the war.

The test was designed to measure native intelligence,

that is, the ability to learn what a soldier needs to know, and also the ability to read simple instructions. Great care was taken to make the instructions very clear and simple to understand. Every word was checked against the Thorndike List of word difficulty and no word was included that was above fourth grade difficulty (3, p.211).

Before being used in the test, every single question was tried out in recruiting offices throughout the country to find out its difficulty. Trials were made on two and one-half ( $2\frac{1}{2}$ ) times as many questions as were actually used. Those selected were found to distinguish between good soldiers.

The test as a whole was tried out on 12,000 men who were representative of all the Armed Services in the last year of World War II (3, p.211).

Whenever a man fails the mental test, he is immediately checked to see if he is "goldbricking." His work record and history of schooling, as provided by his own draft board, are examined. If it is found, for example, that he graduated from high school, he is in the Army regardless of the score on the test. (However, this does not hold true if the Army Personnel Psychologist is of the opinion that other circumstances regardless of education have caused legitimate failure.) Less than one high school graduate out of a hundred should fail the test. Also, if

he has held a good job that is considered evidence that he is not deficient in intelligence no matter what his test score (3, p.211). If, however, he has a history of never being able to hold a job or stay in school, that is considered to indicate that he would not be a satisfactory man in the Army.

WHAT EFFECT DOES ACADEMIC ACHIEVEMENT HAVE ON  
ARMED FORCES QUALIFICATION TEST SCORES?

The following table shows the distribution of men in the 4-F Class from the start of the Korean Conflict in 1950 up to and including February 28, 1953:

Rejection by local boards for obvious defects	239,000
Failed mental test only	565,000
Physical disqualification only	566,000
Failed mental test and also disqualified physically	80,000
Administrative rejections by Armed Forces	33,000
Failed to pass physical inspection at induction	70,000
Unallocated rejections, January-February (1953)	45,000
Total in 4-F category	<u>1,598,000</u>

This total includes an estimated 27,000 rejected for obvious mental defects which are grouped in the category--Rejection by local boards for obvious defects (17, p.34).

A look at this table reveals that 565,000 were rejected for failure to pass the mental test only. Of the total number of rejections, 35.36 percent were rejected for mental reasons. These 565,000 men represent a potential 31 Infantry Divisions.

Irrespective of its actions in the past the United States must now recognize that its security and prosperity depend primarily upon the conservation of its human

resources. With only 6 percent of the world's population, this country is committed to the maintenance of large military forces, and to contributing to the support of the free nations of the world. This national and collective security effort is without parallel in history. To accomplish it with efficiency and without jeopardizing the mainsprings of our social and economic strength will necessitate the maximum use of all our resources, both natural and human (12, pp.12-13). It is with this thought that the effort is being made to determine if there is a significance between educational achievement and successful passing of this test, and also if there is a significance between lack of education and Armed Forces Qualification Test failures.

But even if we were free from a threat of war, 565,000 men between the ages of 18½-26 who are unable to pass a mental test which is premised on a fourth-grade reading ability constitutes a serious social problem. One fully realizes that there is an undetermined relationship between the level of education and the ability of a person to discharge his responsibilities as a worker and as a citizen.

Previously, it has been the purpose to present the reasonableness of the Armed Forces Qualification Test and the adequacy of its standards. It is known, however, that it is difficult, perhaps impossible, to devise a test which

takes proper account of the cultural and environmental factors in the individual's background so that his response to questions reflects his intellectual ability and not his specific knowledge of certain words and circumstances (12, p.41).

The Armed Forces Qualification Test has been repeatedly criticized on the grounds that it was an unsatisfactory device for assessing the mental qualifications of an individual for military service. There is no mystery why these men failed the AFQT. A study made of their examination papers revealed that in many cases they had been able to read only haltingly, and they, therefore, completed only a small number of questions. In many cases it had been a long time since they had read a book or taken an examination (12, p.207). An oft heard statement was to the effect that they were "not much at reading books," but they thought they knew more and could do more than they showed on the test. A check which was made on their civilian records would tend in many cases to support this contention.

The tables and figures which will be given throughout this chapter will give a far more detailed account of Academic Achievement and Army Test Scores than any mere verbal description might possibly give. Perhaps this thought is based strongly on the old Chinese proverb:

"A picture is worth ten thousand words."

On page 37 is a Table of Distribution of the tests by grade of school completed and a classification of whether given to Registrants or Enlistees.

On page 38 is a Table of Distribution of the tests by age and by test groups. In the table you will notice that age 17 is listed. This applies only to the Enlistees, as a man of 17 can enlist with his parent's consent.



TABLE I

## DISTRIBUTION OF TESTS BY GRADE COMPLETED AND BY TEST GROUPS

GRADE	TEST 1 (SS)	TEST 2 (SS)	TEST 1 (ENL)	TEST 2 (ENL)	TOTAL
1					
2	5		1		6
3	4	7	2		13
4	4	7	1	2	14
5	14	13	4	1	32
6	30	20	7	3	60
7	58	39	22	10	129
8	255	177	81	58	571
9	152	165	89	75	481
10	251	234	151	138	774
11	257	256	133	104	750
12	1388	1313	451	437	3589
13	369	348	77	74	868
14	225	190	30	25	470
15	70	109	11	7	197
16	35	55	15	4	109
17	5	10	2	2	19
18	3	4			7
<hr/>					
TOTAL	3125	2947	1077	940	8089
<hr/>					

TABLE II

DISTRIBUTION OF TESTS BY AGE AND BY TEST GROUPS

AGE	TEST 1 (SS)	TEST 2 (SS)	TEST 1 (ENL)	TEST 2 (ENL)	TOTAL
17			183	156	339
18	152	179	271	221	823
19	1223	1152	385	375	3136
20	969	845	104	89	2007
21	368	398	31	27	824
22	169	188	29	14	400
23	101	77	20	12	210
24	56	44	13	10	123
25	48	30	8	8	94
26	39	34	33	28	134
TOTALS	3125	2947	1077	940	8089

On page 41 is a Summary of Test 1 which was given to Selective Service Registrants. It is worth while to note that from Grade 4 on through Grade 12, the percentages of failures steadily decrease. As the failures from Grade 4 on decrease, the mean or average steadily increases. From Grade 13 on through Grade 18, or graduate work, there are no failures. Comment is made on Grade 12 where 1388 took the test, 7 failed or a percentage of failures of .504 percent. Fourteen took the test with six grades of schooling completed; there were six failures or a failing percentage of 42.86. The mean for Grade 12 was 66.57 as against 25.00 for Grade 5. Out of the 3125 who took the test, 100 failed or a failing percentage of 3.2.

On page 42 is a Summary of Test 2 (Selective Service) by grade of school completed. Increased years of schooling completed showed a steady increasing in the mean or average. Likewise there was a steady decreasing in the percentage of failures from Grade 5 upward. The percentage of failures on this test was 2.91.

Summary of Test 1 (Enlistees) by grade of school completed appears on page 43. From Grade 6 upward the percentage of failures decreased. The mean steadily increased from Grade 5 upward with higher years of school completed. Sometimes where only a small sampling has been used we will get a higher percentage of rejects (mental) i.e.,

28.5 percent for Grade 6 as against 25 percent for Grade 5. Especially does this prevail in the grades from 2-5.

The Summary of Test 2 (Enlistee) by grade of school completed shows a steady increase in the mean from Grade 5 upward. The failures totalled 3, but this was an unfortunate happening as far as the sampling was concerned. The overall percentage of .319 seems altogether inadequate for this survey. This Summary is found on page 44.

TABLE III  
SUMMARY OF TEST 1 (SS) BY GRADE OF SCHOOL COMPLETED

GRADE	NUMBER	NUMBER OF FAILURES	PERCENTAGE OF FAILURES	MEAN
1				
2	5	4	80.00	15.60
3	4	4	75.00	12.50
4	4	3	75.00	15.50
5	14	6	42.86	25.00
6	30	9	30.00	32.70
7	58	13	22.42	38.85
8	255	31	12.16	44.58
9	152	11	7.23	52.07
10	251	6	2.391	54.34
11	257	6	2.334	58.38
12	1388	7	0.504	66.57
13	369			72.09
14	225			74.34
15	70			78.40
16	35			80.83
17	5			80.60
18	3			83.33
TOTALS	3125	100	3.2	

TABLE IV

## SUMMARY OF TEST 2 (SS) BY GRADE OF SCHOOL COMPLETED

GRADE	NUMBER	NUMBER OF FAILURES	PERCENTAGE OF FAILURES	MEAN
1				
2				
3	7	6	85.70	10.43
4	7	4	57.10	23.00
5	13	6	54.61	24.85
6	20	9	45.00	28.90
7	39	6	15.38	36.05
8	177	25	14.12	45.15
9	165	17	10.30	50.37
10	234	7	2.99	54.51
11	256	4	1.56	60.41
12	1313	2	0.152	66.51
13	348			73.95
14	190			75.92
15	109			77.93
16	55			77.33
17	10			76.30
18	4			82.75
TOTALS	2947	86	2.91	

TABLE V  
SUMMARY OF TEST 1 (ENL) BY GRADE OF SCHOOL COMPLETED

GRADE	NUMBER	NUMBER OF FAILURES	PERCENTAGE OF FAILURES	MEAN
1				
2	1			28.00
3	2	1	50.00	26.00
4	1	1	100.00	1.00
5	4	1	25.00	25.75
6	7	2	28.50	44.29
7	22			43.05
8	81	2	2.47	44.46
9	89	1	1.12	49.93
10	151	1	0.66	55.88
11	133	1	0.751	57.81
12	451			67.94
13	77			74.49
14	30			78.93
15	11			73.55
16	15			80.47
17	2			84.00
18	-			-
TOTALS	1077	10	0.928	

TABLE VI  
SUMMARY OF TEST 2 (ENL) BY GRADE OF SCHOOL COMPLETED

GRADE	NUMBER	NUMBER OF FAILURES	PERCENTAGE OF FAILURES	MEAN
1				
2				
3				
4	2			50.00
5	1			28.00
6	3	1	33.33	30.00
7	10			41.30
8	58	1	1.72	45.12
9	75			52.57
10	138	1	0.724	55.40
11	104			62.64
12	437			67.95
13	74			72.92
14	25			72.72
15	7			75.43
16	4			84.50
17	2			81.50
18				
TOTALS	940	3	.319	



Percentages--successes and failures on these tests as indicated by grade of school completed are set forth on pages 47, 48, 49, and 50. On pages 51, 52, 53, and 54 failures on the test as indicated by grade of school completed and by age are presented.

Almost 70 percent of the failures on Test 1 (Selective Service) as shown on page 47 had less than nine years of schooling completed. The highest number of failures occurred in the age brackets nineteen and twenty, but again the bulk of the failures were among those with less than nine years of schooling completed. The table on page 48 for Test 2 (Selective Service) showed much the same condition prevailing.

There might be some question about men age 26, the number, that is, who failed the test. In most cases these men were men who were mental rejects during World War II, and had been sent back for another examination during the time of the Korean episode.

Summaries of the tests are set out by chronological age on pages 55, 56, 57, and 58. On page 55, Summary of Test 1 (Selective Service) we find 15.13 percent failures for age 26. As mentioned previously, in many cases these men had been mental failures in World War II. Outside of age 26 there does not seem to be any consistent pattern of failures as influenced by age. On page 56, Test 2

(Selective Service) the same condition or pattern prevails concerning age 26.

Percentages--successes and failures on the tests as indicated by chronological age are presented on pages 59, 60, 61, and 62. No definite trend or pattern prevails relative to the influence of age.

TABLE VII

PERCENTAGES--SUCCESSES AND FAILURES ON TEST 1 (SS)  
AS INDICATED BY GRADE OF SCHOOL COMPLETED

	GRADE OF SCHOOL COMPLETED	
	SUCCESSES	FAILURES
1	-	-
2	20.00	80.00
3	25.00	75.00
4	25.00	75.00
5	57.14	42.86
6	70.00	30.00
7	77.58	22.42
8	87.84	12.16
9	92.77	7.23
10	97.60	2.39
11	97.66	2.33
12	99.49	0.504
13	100.00	-
14	100.00	-
15	100.00	-
16	100.00	-
17	100.00	-
18	100.00	-

TABLE VIII

PERCENTAGES—SUCCESSSES AND FAILURES ON TEST 2 (SS)  
AS INDICATED BY GRADE OF SCHOOL COMPLETED

	SUCCESSSES	FAILURES
1	-	-
2	-	-
3	14.30	85.70
4	42.90	57.10
5	45.39	54.61
6	55.00	45.00
7	84.62	15.38
8	85.88	14.12
9	89.70	10.30
10	97.01	2.99
11	98.44	1.56
12	99.848	0.152
13	100.00	-
14	100.00	-
15	100.00	-
16	100.00	-
17	100.00	-
18	100.00	-

TABLE IX

PERCENTAGES—SUCSESSES AND FAILURES ON TEST 1 (ENL)  
AS INDICATED BY GRADE OF SCHOOL COMPLETED

	SUCSESSES	FAILURES
1	-	-
2	100.00	00.00
3	50.00	50.00
4	00.00	100.00
5	75.00	25.00
6	71.50	28.50
7	100.00	00.00
8	97.53	2.47
9	98.88	1.12
10	99.34	0.66
11	99.24	0.75
12	100.00	-
13	100.00	-
14	100.00	-
15	100.00	-
16	100.00	-
17	100.00	-
18	100.00	-

TABLE X

PERCENTAGES—SUCCESSSES AND FAILURES ON TEST 2 (ENL)  
AS INDICATED BY GRADE OF SCHOOL COMPLETED

	GRADE OF SCHOOL COMPLETED	
	SUCCESSSES	FAILURES
1	-	-
2	-	-
3	-	-
4	100.00	00.00
5	100.00	00.00
6	67.67	33.33
7	100.00	00.00
8	98.78	1.72
9	100.00	00.00
10	99.27	0.724
11	100.00	00.00
12	100.00	00.00
13	100.00	00.00
14	100.00	00.00
15	100.00	00.00
16	100.00	00.00
17	100.00	00.00
18	100.00	00.00

TABLE XI

## FAILURES, TEST 1 (SS)

## GRADE OF SCHOOL COMPLETED

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	TOTAL
<u>AGE</u>																			
17																			
18							1	3			1								5
19					3	3	4	11	6	1	2	2							32
20		1		1	3	5	4	10	2	3	3	2							34
21			1			1	1	3		1		1							8
22			1					3	2			1							7
23		1		1			2												4
24																			
25							1					1							2
26		2	2	1					1	1									7
TOTALS		4	4	3	6	9	13	30	11	6	6	7							99

TABLE XII

## FAILURES, TEST 2 (SS)

## GRADE OF SCHOOL COMPLETED

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	TOTAL
<u>AGE</u>																			
17																			
18				1		1	1	1		2									6
19			1	2	3	2	1	10	9	3									31
20			1	1	1	3	1	7	2	1	1	2							20
21					2	2	1	2		1	1								9
22			1				1	2	3										7
23								1	2		1								4
24						1													1
25								1			1								2
26			3				1	1	1										6
TOTALS			6	4	6	9	6	25	17	7	4	2							86



TABLE XIII

FAILURES, TEST 1 (ENL)

GRADE OF SCHOOL COMPLETED

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	TOTAL
<u>AGE</u>																			
17										1									1
18				1	1	2		1	1										6
19																			
20								1											1
21																			
22																			
23																			
24			1								1								2
25																			
26																			
TOTALS			1	1	1	2		2	1	1	1								10

TABLE XIV

FAILURES, TEST 2 (ENL)

GRADE OF SCHOOL COMPLETED

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	TOTAL
<u>AGE</u>																			
17								1											1
18						1				1									2
19																			
20																			
21																			
22																			
23																			
24																			
25																			
26																			
TOTALS						1		1		1									3

TABLE XV  
SUMMARY OF TEST 1 (SS) BY CHRONOLOGICAL AGE

AGE	NUMBER	NUMBER OF FAILURES	PERCENTAGE OF FAILURES	MEAN
17				
18	152	5	3.29	64.14
19	1224	32	2.61	62.99
20	969	34	3.509	62.27
21	368	8	2.17	64.00
22	169	8	4.73	63.88
23	101	4	3.96	64.71
24	56			63.54
25	48	2	4.17	58.88
26	39	7	15.13	49.20
TOTALS	3126	100	3.2	

TABLE XVI  
SUMMARY OF TEST 2 (SS) BY CHRONOLOGICAL AGE

AGE	NUMBER	NUMBER OF FAILURES	PERCENTAGE OF FAILURES	MEAN
17				
18	179	6	3.35	62.05
19	1152	31	2.69	63.73
20	845	20	2.36	64.47
21	398	9	2.26	64.87
22	188	7	3.72	65.34
23	77	4	5.19	65.42
24	44	1	2.27	64.45
25	30	2	6.66	57.67
26	34	6	17.60	49.56
TOTALS	2947	86	2.91	

TABLE XVII  
SUMMARY OF TEST 1 (ENL) BY CHRONOLOGICAL AGE

AGE	NUMBER	NUMBER OF FAILURES	PERCENTAGE OF FAILURES	MEAN
17	183	1	0.54	54.75
18	271	6	2.21	60.69
19	285			64.37
20	104	1	0.96	65.67
21	31			65.33
22	29			67.56
23	20			63.75
24	13	2	15.38	56.30
25	8			54.12
26	33			61.69
TOTALS	1077	10	0.928	

TABLE XVIII  
SUMMARY OF TEST 2 (ENL) BY CHRONOLOGICAL AGE

AGE	NUMBER	NUMBER OF FAILURES	PERCENTAGE OF FAILURES	MEAN
17	156	1	0.641	55.14
18	221	2	0.90	62.19
19	375			66.20
20	89			66.02
21	27			66.96
22	14			69.93
23	12			61.83
24	10			67.00
25	8			50.125
26	28			61.07
TOTALS	940	3	.319	

TABLE XIX

PERCENTAGES--SUCSESSES AND FAILURES ON TEST 1 (SS)  
AS INDICATED BY CHRONOLOGICAL AGE

CHRONOLOGICAL AGE	SUCSESSES	FAILURES
	17	-
	18	96.71
	19	97.39
	20	96.49
	21	97.83
	22	95.27
	23	96.04
	24	100.00
	25	95.83
	26	84.87

TABLE XX

PERCENTAGES--SUCSESSES AND FAILURES ON TEST 2 (SS)  
AS INDICATED BY CHRONOLOGICAL AGE

CHRONOLOGICAL AGE	SUCSESSES	FAILURES
	17	-
	18	96.65
	19	97.31
	20	97.64
	21	97.74
	22	96.28
	23	94.81
	24	97.73
	25	93.34
	26	82.40



TABLE XXI

PERCENTAGES--SUCCESSIONS AND FAILURES ON TEST 1 (ENL)  
AS INDICATED BY CHRONOLOGICAL AGE

CHRONOLOGICAL AGE	SUCCESSSES	FAILURES	
	17	99.46	0.54
	18	97.79	2.21
	19	100.00	00.00
	20	99.04	0.96
	21	100.00	00.00
	22	100.00	00.00
	23	100.00	00.00
	24	84.62	15.38
	25	100.00	00.00
	26	100.00	00.00

TABLE XXII

PERCENTAGES--SUCSESSES AND FAILURES ON TEST 2 (ENL)  
AS INDICATED BY CHRONOLOGICAL AGE

CHRONOLOGICAL AGE	SUCCESSSES	FAILURES	
	17	99.34	0.64
	18	99.10	0.90
	19	100.00	00.00
	20	100.00	00.00
	21	100.00	00.00
	22	100.00	00.00
	23	100.00	00.00
	24	100.00	00.00
	25	100.00	00.00
	26	100.00	00.00

Test scores are commonly expressed as raw, percentile, or standard scores. The raw score is simply the number of problems correctly solved, the number of words known, or some other index of the work done. It therefore needs no special defining. But raw scores are not meaningful until they are converted into some other type of score which shows the examinee's standing with regard to a group of persons in the same occupation, school grade, or problem group.

As indicated above, percentile ranks are based on the frequency with which cases fall at given points on the scale. They have the advantage of being based on a concept which is familiar to educators and to people in general, who readily grasp the significance of the statement that a college senior has more mechanical comprehension than 80 out of 100 applicants for engineering positions, or more ability to perceive differences in pairs of numbers than only 10 out of 100 clerical workers. This is what a percentile score tells one when the cases are counted from the bottom upward, the usual method (20, p.646).

In this paper from pages 30-31, the method of setting up this test and the manner of standardization was discussed. In dealing with a large group of cases in the manner in which this study is attempting, a chart showing the percentile distribution by grade of school completed is a convenient means of expression. The chart shows the total

number within each percentile grouping, and it also shows what percentage of the total number fall within each percentile grouping.

Also there are companion charts which show the percentage of grade of school completed categories as expressed by percentile groups for each test. On Chart 1-A, page 66 of this paper, it is noted that no one falls in the 90-100 percentile grouping until we reach Grade 7. Of the 58 who took Test 1 as Selective Service Registrants, having completed 7 grades of schooling, only one person fell in this category (refer to page 65), and this constitutes 1.73 percent of the group. It is interesting to note that on page 66 for Selective Service Registrants, for the first six grades we do not find anyone falling in the percentile groupings from 50-100.

The following pages 65-80 set forth percentile distributions by grade of school completed (page 66, Selective Service Registrants, Test 1; page 69, Selective Service Registrants, Test 2; page 73, Prospective Enlistees, Test 1; page 77, Prospective Enlistees, Test 2), and the percentage of grade of school completed categories as expressed by percentile groupings (Test 1, Selective Service Registrants, pages 66-68; Test 2, Selective Service Registrants, pages 70-72; Test 1, Prospective Enlistees, pages 74-76; Test 2, Prospective Enlistees, pages 78-80).

CHART 1

## PERCENTILE DISTRIBUTION BY GRADE OF SCHOOL COMPLETED FOR TEST 1 (SS)

	GRADE OF SCHOOL COMPLETED																		TOTAL	PERCENTAGE
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
90-100							1	5	10	14	13	262	123	104	40	25	3	2	602	19.27
80- 90								8	9	15	25	228	76	34	15	4	1	1	416	13.31
70- 80							2	8	11	25	36	226	51	29	7	4	1		400	12.80
60- 70							1	11	7	21	42	203	51	31	4				371	11.87
50- 60							2	23	19	29	38	159	33	12	2	2			319	10.21
40- 50						3	1	32	16	32	32	120	17	7	2				262	8.38
30- 40						3	15	39	23	43	23	105	8	3					262	8.38
20- 30				1	2	6	11	44	31	39	20	53	9	2					218	6.98
10- 20	1	1		6	9	12	54	15	27	22	25	1	3						176	5.63
0- 10	4	3	3	6	9	13	31	11	6	6	7								99	3.17
TOTALS	5	4	4	14	30	58	255	152	251	257	1388	369	225	70	35	5	3	3125	100.00	

CHART 1-A

PERCENTAGE OF GRADE OF SCHOOL COMPLETED CATEGORIES  
AS EXPRESSED BY PERCENTILE GROUPINGS FOR TEST 1 (SS)

	GRADE OF SCHOOL COMPLETED						
	1	2	3	4	5	6	7
90-100							1.73
80- 90							
70- 80							3.45
60- 70							1.72
50- 60							3.45
40- 50						10.00	1.72
30- 40						10.00	25.86
20- 30				25.00	14.30	20.00	18.97
10- 20		20.00	25.00		42.90	30.00	20.69
0- 10		80.00	75.00	75.00	42.90	30.00	22.41

CHART 1-B

PERCENTAGE OF GRADE OF SCHOOL COMPLETED CATEGORIES  
AS EXPRESSED BY PERCENTILE GROUPINGS FOR TEST 1 (SS)

	GRADE OF SCHOOL COMPLETED						
	8	9	10	11	12	13	14
90-100	1.96	6.58	5.58	5.06	18.88	33.33	46.22
80- 90	3.14	5.92	5.98	9.73	16.43	20.60	15.11
70- 80	3.14	7.24	9.96	14.00	16.28	13.82	12.89
60- 70	4.32	4.61	8.37	16.34	14.63	13.82	13.78
50- 60	9.02	12.50	11.56	14.79	11.46	8.94	5.34
40- 50	12.55	10.53	12.75	12.45	8.65	4.61	3.11
30- 40	15.30	15.13	17.13	8.95	7.57	2.17	1.33
20- 30	17.26	20.40	15.54	7.78	3.82	2.44	0.89
10- 20	21.18	9.87	10.76	8.56	1.80	0.27	1.33
0- 10	12.16	7.24	2.39	2.34	.51		

# CHART 1-C

PERCENTAGE OF GRADE OF SCHOOL COMPLETED CATEGORIES  
AS EXPRESSED BY PERCENTILE GROUPINGS FOR TEST 1 (SS)

	GRADE OF SCHOOL COMPLETED			
	15	16	17	18
90-100	57.14	71.43	60.00	66.67
80- 90	21.43	11.43	20.00	33.33
70- 80	10.00	11.43	20.00	
60- 70	5.72			
50- 60	2.86	5.71		
40- 50	2.86			
30- 40				
20- 30				
10- 20				
0- 10				



CHART 2

## PERCENTILE DISTRIBUTION BY GRADE OF SCHOOL COMPLETED FOR TEST 2 (SS)

	GRADE OF SCHOOL COMPLETED																		TOTAL	PERCENTAGE
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
90-100								2	7	12	28	230	133	89	67	29	6	3	606	20.56
80- 90								4	8	16	31	238	96	34	14	9	1	1	452	15.33
70- 80						1		9	9	25	33	203	39	33	14	9	2		377	12.79
60- 70								21	23	22	34	204	34	19	6	4			367	12.45
50- 60							1	11	16	27	30	146	16	6	3	2			258	8.75
40- 50							1	19	16	28	25	116	14	6	3				228	7.73
30- 40					1		7	24	22	39	29	93	10	2	1	2			230	7.80
20- 30			1		3	14	27	26	30	25	51	5	1						183	6.21
10- 20	1	2	6	7	10	35	21	28	17	30	1			1			1		160	5.43
0- 10	6	4	6	9	6	25	17	7	4	2									86	2.95
TOTALS	7	7	13	20	39	177	165	234	256	1313	348	190	109	55	10	4	2947		100.00	

CHART 2-A

PERCENTAGE OF GRADE OF SCHOOL COMPLETED CATEGORIES  
AS EXPRESSED BY PERCENTILE GROUPINGS FOR TEST 2 (SS)

		GRADE OF SCHOOL COMPLETED						
		1	2	3	4	5	6	7
PERCENTILES	90-100							
	80- 90							
	70- 80						5.00	
	60- 70							
	50- 60							2.57
	40- 50							2.57
	30- 40					7.69		17.95
	20- 30				14.29		15.00	35.90
	10- 20			12.50	28.57	46.15	35.00	25.64
	0- 10			87.50	57.14	46.15	45.00	15.38

CHART 2-B

PERCENTAGE OF GRADE OF SCHOOL COMPLETED CATEGORIES  
AS EXPRESSED BY PERCENTILE GROUPINGS FOR TEST 2 (SS)

	GRADE OF SCHOOL COMPLETED						
	8	9	10	11	12	13	14
90-100	1.13	4.24	5.13	10.94	17.52	38.22	46.84
80- 90	2.26	4.85	6.84	12.11	18.13	27.59	17.90
70- 80	5.09	5.46	10.68	12.89	15.46	11.21	17.37
60- 70	11.86	13.94	9.40	13.28	15.54	9.77	10.00
50- 60	6.22	9.70	11.54	11.72	11.12	4.60	3.16
40- 50	10.74	9.70	11.97	9.77	8.84	4.02	3.16
30- 40	13.56	13.33	16.67	11.33	7.08	2.87	1.05
20- 30	15.26	15.76	12.82	9.77	3.88	1.42	0.53
10- 20	19.77	12.73	11.97	6.64	2.29	0.30	
0- 10	14.13	10.30	2.99	1.56	.15		

# CHART 2-C

PERCENTAGE OF GRADE OF SCHOOL COMPLETED CATEGORIES  
AS EXPRESSED BY PERCENTILE GROUPINGS FOR TEST 2 (SS)

## GRADE OF SCHOOL COMPLETED

	15	16	17	18
90-100	61.47	52.73	60.00	75.00
80- 90	12.85	16.36	10.00	25.00
70- 80	12.85	16.36	20.00	
60- 70	5.50	7.27		
50- 60	2.75	3.64		
40- 50	2.75			
30- 40	0.92	3.64		
20- 30				
10- 20	0.92		10.00	
0- 10				

CHART 3

## PERCENTILE DISTRIBUTION BY GRADE OF SCHOOL COMPLETED FOR TEST 1 (ENL)

## GRADE OF SCHOOL COMPLETED

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	TOTAL	PERCENTAGE
90-100						1	1	1		9	10	100	30	22	5	11	2		192	17.83
80- 90								1	7	12	15	89	18	2	2	3			149	13.84
70- 80							1	1	10	12	12	65	11	3	1				116	10.77
60- 70								4	2	13	18	61	9		1				108	10.03
50- 60						2		10	10	19	18	48	4	2	1				114	10.59
40- 50							1	8	10	23	10	35	5						92	8.54
30- 40						1	5	9	9	30	25	25							104	9.66
20- 30							5	20	21	18	12	17				1			94	8.73
10- 20	1	1		3	1	9	25	19	14	12	11			1	1				98	9.10
0- 10		1	1	1	2			2	1	1	1								10	0.93
TOTALS	1	2	1	4	7	22	81	89	151	133	451	77	30	11	15	2			1077	100.00

CHART 3-A

PERCENTAGE OF GRADE OF SCHOOL COMPLETED CATEGORIES  
AS EXPRESSED BY PERCENTILE GROUPINGS FOR TEST 1 (ENL)

	GRADE OF SCHOOL COMPLETED						
	1	2	3	4	5	6	7
90-100						14.29	4.55
80- 90							
70- 80							4.55
60- 70							
50- 60						28.57	
40- 50							4.55
30- 40						14.29	22.73
20- 30							22.73
10- 20		100.00	50.00		75.00	14.29	41.00
0- 10			50.00	100.00	25.00	28.57	

CHART 3-B

PERCENTAGE OF GRADE OF SCHOOL COMPLETED CATEGORIES  
AS EXPRESSED BY PERCENTILE GROUPINGS FOR TEST 1 (ENL)

## GRADE OF SCHOOL COMPLETED

	8	9	10	11	12	13	14
90-100	1.23		5.96	7.52	22.17	38.96	73.33
80- 90	1.23	7.87	7.95	11.28	19.73	23.38	6.66
70- 80	1.23	11.24	7.95	9.02	14.41	14.29	10.00
60- 70	4.94	2.25	8.61	13.54	13.53	11.69	
50- 60	12.35	11.24	12.58	13.54	10.64	5.20	6.66
40- 50	9.87	11.24	15.23	7.52	7.76	6.50	
30- 40	11.11	10.11	19.87	18.80	5.54		
20- 30	24.76	23.69	11.92	9.02	3.77		
10- 20	30.86	21.35	9.27	9.02	2.44		3.33
0- 10	2.47	1.12	0.66	0.75			

CHART 3-C

PERCENTAGE OF GRADE OF SCHOOL COMPLETED CATEGORIES  
AS EXPRESSED BY PERCENTILE GROUPINGS FOR TEST 1 (ENL)

	GRADE OF SCHOOL COMPLETED			
	15	16	17	18
90-100	45.46	73.33	100.00	
80- 90	18.18	20.00		
70- 80	9.09			
60- 70	9.09			
50- 60	9.09			
40- 50				
30- 40				
20- 30		6.67		
10- 20	9.09			
0- 10				



CHART 4

## PERCENTILE DISTRIBUTION BY GRADE OF SCHOOL COMPLETED FOR TEST 2 (ENL)

## GRADE OF SCHOOL COMPLETED

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	TOTAL	PERCENTAGE
90-100									1	6	10	90	23	10	5	4	2		151	16.07
80- 90								2	10	10	12	79	16	7	1				137	14.58
70- 80								1	3	13	24	88	18	4					151	16.06
60- 70								4	7	19	15	50	4						99	10.53
50- 60				1		1	1	3	9	16	11	34	10	3					89	9.47
40- 50							1	9	6	17	8	47		1					89	9.47
30- 40							2	8	10	21	10	31	2						84	8.94
20- 30			1				2	12	15	19	8	10							67	7.13
10- 20				1	1	4	18	14	16	6	8	1			1				70	7.45
0- 10					1			1		1									3	0.32
TOTALS			2	1	3	10	58	75	138	104	437	74	25	7	4	2			940	100.00

# CHART 4-A

PERCENTAGE OF GRADE OF SCHOOL COMPLETED CATEGORIES  
AS EXPRESSED BY PERCENTILE GROUPINGS FOR TEST 2 (ENL)

## GRADE OF SCHOOL COMPLETED

	1	2	3	4	5	6	7
90-100							
80- 90							
70- 80							
60- 70							
50- 60				50.00		33.33	10.00
40- 50							10.00
30- 40							20.00
20- 30				50.00			20.00
10- 20					100.00	33.33	40.00
0- 10						33.33	

CHART 4-B

PERCENTAGE OF GRADE OF SCHOOL COMPLETED CATEGORIES  
AS EXPRESSED BY PERCENTILE GROUPINGS FOR TEST 2 (ENL)

		GRADE OF SCHOOL COMPLETED						
		8	9	10	11	12	13	14
PERCENTILES	90-100		1.33	4.35	9.62	20.60	31.08	40.00
	80- 90	3.45	13.33	7.25	11.54	18.08	21.62	28.00
	70- 80	1.73	4.00	9.42	23.08	20.14	24.32	16.00
	60- 70	6.90	9.33	13.77	14.42	11.44	5.41	
	50- 60	5.17	12.00	11.60	10.58	7.78	13.51	12.00
	40- 50	15.52	8.00	12.32	7.70	10.76		4.00
	30- 40	13.79	13.33	15.22	9.62	7.10	2.70	
	20- 30	20.69	20.00	13.77	7.70	2.29		
	10- 20	31.03	18.67	11.60	5.77	1.83	1.35	
0- 10	1.73		.97					

CHART 4-C

PERCENTAGE OF GRADE OF SCHOOL COMPLETED CATEGORIES  
AS EXPRESSED BY PERCENTILE GROUPINGS FOR TEST 2 (ENL)

	GRADE OF SCHOOL COMPLETED			
	15	16	17	18
90-100	71.42	100.00	100.00	
80- 90	14.29			
70- 80				
60- 70				
50- 60				
40- 50				
30- 40				
20- 30				
10- 20	14.29			
0- 10				

No single statistical procedure has opened up so many new avenues of discovery in psychology and education as that of correlation. This is understandable when one remembers that scientific progress depends upon finding out what things are co-related and what things are not. A coefficient of correlation is a single number that tells us to what extent two things are related; to what extent variations in the one go with variations in the other. Without knowledge of how one thing varies with another, predictions would be impossible. And wherever casual relationships are involved, without knowledge of co-variation, one should find himself unable to control one thing by manipulating another (13, p.154).

For example, when it is known that the higher a girl's score in a clerical aptitude test the higher the probable performance she is likely to exhibit after training, one can therefore use scores on this test to predict the levels of proficiency. It can be said that there is a high positive correlation between aptitude test scores and clerical success (13, p.154). This fact is discovered by finding a coefficient of correlation between the scores of a number of girls and measuring clerical performance later for the very same girls. A coefficient of correlation can never be computed for one person alone, nor can it be computed without having two sets of measurements on the same

individuals. In the particular problem with which this study is dealing, grade of school completed is taken as one measurement and the score made on the AFQT as the other measurement.

The coefficient of correlation is one of those summarizing numbers, like a mean or a standard deviation, which though it is a single number, tells a story. It can vary from a value of +1.00, which means perfect positive correlation, through zero, which means complete independence or no correlation whatever, on down to -1.00, which means perfect negative correlation (13, pp.154-155).

At this time, it would be desirable to set up a working definition of the term "mean." The mean (M) is what is most often meant when, in every day language, talk refers to averages. It is computed by adding up the ages, heights, or I. Q's of all persons in the group and dividing the sum by the total number of cases. The mean is the most widely used statistical measure of central tendency because it is part of a system which lends itself to many types of manipulation. When the number of cases is small, however, it can be seriously distorted by a few extreme cases (20, p.644).

Along with the mean, a working definition of the term "standard deviation" is needed. The standard deviation ( $\sigma$ ) is a measure of dispersion commonly used to

describe the variability of groups for which the means have been ascertained. It is virtually an average of the distances of all scores in a distribution from their own average score. Means and standard deviation are part of the moment system, as shall be shown when correlations are worked out, just as medians and quartiles are part of the percentile system. The standard deviation is, with the mean, the more commonly used measure, because it lends itself readily to use in other formulas. The distance between one sigma either side of the mean of a normal distribution includes not 50 percent of the cases, as in the interquartile range, but the middle 68 percent. This number may seem awkward, but there is no special virtue in 50 percent, and the standard deviation actually gives a somewhat truer picture of the scattering of cases or scores around the mean (20, pp.645-646). One fundamental difference between the percentile and moment systems should be kept in mind--percentile, quartile, and other such scores are based on the number of cases, but standard deviations or sigmas are based on distances from the mean. The latter are therefore more truly measuring sticks in the usual sense of the term, and give a better idea of dispersion than do the former.

When original measurements are relatively large numbers, particularly when the midpoints and the

frequencies are large numbers, a short-cut procedure is used for finding the mean which saves pencil and paper work.

This procedure is known as "Choosing a Guessed Mean." First select a guessed mean. This may be chosen anywhere, for its choice is arbitrary. In order to obtain the greatest benefits from the short method, it is well to choose a guessed mean rather near to the actual mean, at any rate, somewhere near the center of distribution (13, p.61).

The next concern is with the correction to add to the guessed mean. It is necessary to find the  $fx'$  product for each interval, taking great care to record algebraic signs.

The correction to add to the guessed mean has the following formula:  $c = i \left( \frac{\sum fx'}{N} \right)$

where  $i$  is the size of the class interval.

$x'$  is deviation of a class interval from the guessed mean in terms of  $i$  as the unit.

$f$  is the frequency within a class interval.

$N$  is the total number of measurements (13, p.63).

The steps involved in the short method of computing the mean may be summarized as follows (13, pp.63-64):

1. Set up a frequency distribution.
2. Choose a guessed mean. This is the midpoint of the interval (1) near the center of the distribution; or (2) containing the median



or mode or both; or (3) probably containing the actual mean.

3. Assign to the class intervals new small integral values, starting with zero at the interval containing the guessed mean, with positive values above and negative values below.
4. Find the  $fx'$  product of each interval, and record in the column.
5. Sum the  $fx'$  products algebraically. This is  $\Sigma fx'$ .
6. Divide the sum of the  $fx'$  products by  $N$ .
7. Multiply this quotient by  $i$ , the size of the class interval. This gives the correction  $c$ .
8. Add this correction algebraically to the guessed mean. This gives the mean.

A single formula representing the preceding steps is:  $M$  (actual Mean) =  $M'$  (Assumed Mean) +  $i \left( \frac{\Sigma fx'}{N} \right)$

Everything is now in order to set up what is known as a scatter-diagram. When  $N$  is large, even when  $N$  is moderate in size, and when no calculating machine is available, the customary procedure is to group data in both  $X$  and  $Y$  and to form a scatter-diagram or a correlation diagram (13, pp.161-162).

An example of a scatter-diagram is found on page 93. of this study. In setting up a double grouping of data, a table is prepared with columns and rows--columns for the dispersion of  $Y$  scores within each class interval for the

X scale, and rows for the dispersion of X scores within each class interval for the Y scale. Along with the top of the table (see page 93) are listed the grade limits in X (which in this case represents the grade of school completed). Along the left-hand margin are listed the score limits for the class intervals in Y (which in this case represents the AFQT). For example, if one individual completed 8 years of schooling and made a score of 83 on the AFQT, a tally mark would be placed for him in the cell of the diagram at the intersection of the column for the interval 7-9 (grade of school completed) in X and the row for the interval 81-85 in Y (AFQT scores). All other individuals are similarly located in their proper cells.

When the tallying is completed, write the number of cases, or the cell frequency, in each of the cells. Next, sum the cell frequencies in the rows separately, recording each frequency in the last column under the heading  $f_y$ . When this column is filled, one has the total frequency distribution for test Y (which in this case is the AFQT). Next, the cell frequencies in all the columns are summed up, writing them in the bottom row with its heading  $f_x$ . When completed, this row gives the total frequency distribution for X (which in this case is the grade of school completed). Their sums should both equal N.

Everything is now ready to compute a Pearson product

moment coefficient from a scatter-diagram. When  $r$  is computed from a scatter-diagram the formula becomes:

$$r_{xy} = \frac{\frac{\sum x'y'}{N} - (c'_x c'_y)}{(\sigma'_x)(\sigma'_y)}$$

where  $x'$  and  $y'$  are deviations from the guessed mean in terms of the class interval as the unit

$c'_x$  and  $c'_y$  are corrections in  $X$  and  $Y$  in class interval units.

$\sigma'_x$  and  $\sigma'_y$  are standard deviations in  $X$  and  $Y$  in terms of the class interval as the unit (13, p.162). The details of this application will now be explained and illustrated.

The procedures for determining the corrections and standard deviations are set forth below:

$$c = i\left(\frac{\sum fx'}{N}\right) \text{ as is shown on page 84 of this paper.}$$

$$SD \text{ (Standard Deviation)} = \sqrt{\frac{fx^2}{N} - c^2 x^1} \text{ (11, p.45).}$$

Reference is now made to the scatter-diagram for Test 1, Selective Service on page 93.

$$c'_x = \frac{\sum fx'}{N} = \frac{162}{3125} = .0518$$

$$c'_y = \frac{\sum fy'}{N} = \frac{3032}{3125} = .97$$

$$\begin{aligned}
 \sigma'_x &= \sqrt{\frac{\sum fx^2}{N} - (c'_x)^2} = \sqrt{\frac{1574}{3125} - (.0518)^2} \\
 &= \sqrt{.503 - .0027} \\
 &= \sqrt{.5003} \\
 &= 0.707
 \end{aligned}$$

$$\begin{aligned}
 \sigma'_y &= \sqrt{\frac{\sum fy'^2}{N} - (c'_y)^2} = \sqrt{\frac{39022}{3125} - (.97)^2} \\
 &= \sqrt{12.48 - (.9409)} \\
 &= \sqrt{11.4391} \\
 &= 3.39
 \end{aligned}$$

One can now begin determining the sum of the cross products. This new process is the calculation of the cross products or the products of the moments, and their sum, in other words,  $x'y'$ . It is best to begin with the idea that every cell has its own  $x'y'$  product and to keep that idea in mind. It is well to determine the  $x'y'$  product for every cell in which individuals fall (13, p.163-164).

The  $x'y'$  product for any cell is simply the product of the  $x'$  value times the  $y'$  value of that cell, close watch being kept of the algebraic signs. This matter is easily checked, of course, by making sure that the sign of every  $x'y'$  product is positive in the upper right quarter of the chart and also the lower left quarter, but they are all negative in the upper left and lower right quarters.

This rule presupposes that the X measurements are increasing from left to right and that Y measurements are increasing from below upward.

Having given every cell its  $x'y'$  value and having recorded it in the cell, note how many individuals have that  $x'y'$  value, in other words, the frequency in that cell. Next multiply the cell product by the frequency. All that remains now is to summate them. One does this in both the columns and in the rows for the sake of checking, for this is an unusually critical number in the correlation formula, and because of the many steps involved in deriving it there are many opportunities for errors. The last two columns in the scatter-diagram are devoted to the sums of  $fx'y'$  values in the rows. Keep the sums of the positive products in one of these columns and the sums of the negative products in the other. The last two rows of the table are reserved likewise for summing the positive and negative sums in the columns. Summing everything in the last two columns (also in the last two rows) of the table gives us  $x'y'$ , and the two estimates should check exactly. Reference is made again to the scatter-diagram for Selective Service AFQT-1 on page 93. The formula can now be applied as set forth on page 87:

$$\begin{aligned}
 & \frac{4348 - (.0518) (.97)}{3125} \\
 r_{xy} &= \frac{1.39136 - (.050246)}{(.707) (3.39)} \\
 &= \frac{1.341114}{2.39673} = 0.56
 \end{aligned}$$

The interpretation of the size of  $r$  depends very much upon the purpose for which it is to be used and the reason for computing it. What would be a large coefficient for one purpose would be regarded as small for another. Interpretation is therefore largely a relative matter; relative to the area of investigation in which one is working and to other factors. But taking correlations just at large, without particular regard to their use and as a general orientation, it may be said that the strength of relationship can be described roughly as follows for various  $r$ 's (13, pp.164-165):

Less than .20.....slight, almost negligible relationship  
 .20- .40.....low correlation; definite but small relationship  
 .40- .70.....moderate correlation; substantial relationship  
 .70- .90.....high correlation; marked relationship

.90-1.00.....very high correlation; very  
dependable relationship

It will be assumed the mean for the number of years of school completed to be between 10-12. The midpoint would be at 11.  $i$  or interval = 3.

Use the formula for the correction to add to the guessed mean on page 84.

$$c'_x = .0518 \text{ (page 87)}$$

$$ci = 3 \times .0518 = .1554$$

Use formula for finding actual mean on page 85

Assumed mean is 11

$$ci = .1554$$

---

Mean = 11.1554 (or 11.16, mean of school completed).

Assumed mean AFQT scores between 56-60. This would make the midpoint 58.

$$i = 5$$

Use formula for correction to add to guessed mean on page 84.

$$c'_y = .97 \text{ (page 87)}$$

$$ci = .97 \times 5 = 4.85$$

Use formula for actual mean on page 85.

Assumed mean = 58.00

$$ci = 4.85$$

---

Mean = 62.85 (mean of AFQT for Selective Service Registrants, Test 1).

Use formula SD (Standard Deviation) page 87.

$$\sigma_x = .707 \text{ (page 87)}$$

$$i = 3$$

$$SD = 2.121$$

$$\sigma_y = 3.39$$

$$i = 5$$

$$SD = 16.95$$



**TABLE XXIII**  
**SCATTER DIAGRAM FOR**  
**TEST I (SS)**

	1-3	4-6	7-9	10-12	13-15	16-18	8-4	y'	$\Sigma y'$	$\Sigma y'^2$	$\Sigma X'$	y'
86-90			3	50	63	18	134	+6	+804	4824	594	18
81-85			10	162	154	11	337	+5	+1685	8425	880	50
76-80			11	198	124	4	337	+4	+1348	5392	528	44
71-75			17	266	93	15	381	+3	+1143	3429	309	51
66-70			22	285	89	3	399	+2	+798	1596	190	44
61-65			19	231	60	1	311	+1	+311	311	62	19
56-60		1	52	223	40	1	317	0	+6089			
51-55		4	49	155	17		225	-1	-225	225	57	17
46-50		1	60	121	9		191	-2	-382	764	124	18
41-45		4	48	70	5		127	-3	-381	1143	168	15
36-40		6	54	62	9		131	-4	-524	2096	264	36
31-35	1	5	35	31	1		73	-5	-365	1825	240	5
26-30	1	10	37	23			71	-6	-426	2556	360	
21-25	1	4	24	9			38	-7	-266	1862	245	
16-20		5	12	5			22	-8	-176	1408	176	
11-15	2	2	6	2			12	-9	-108	972	144	
6-10	1		3	1			5	-10	-50	500	60	
1-5	3	6	3	2			14	-11	-154	1694	264	
$\Sigma X$	9	48	465	1896	664	43	3125		-3057	39022	4665	-317 (4348)
$X'$	-3	-2	-1	0	+1	+2						
$\Sigma X'$	-27	-96	-465	0	664	86	+162	$\Sigma X'$				
$\Sigma X'^2$	81	192	465	0	664	172	+1574	$\Sigma X'^2$				
$\Sigma X'Y'$	237	558	1307	0	2161	402				+4665		
$\Sigma$			226	0	91					317		(4348)

Reference is now made to scatter-diagram of Test 2,  
Selective Service on page 96.

$$c'_x = \frac{\sum fx'}{N} = \frac{303}{2947} = .1028$$

$$c'_y = \frac{\sum fy'}{N} = \frac{622}{2947} = .211$$

$$\sigma'_x = \sqrt{\frac{\sum fx'^2}{N} - (c'_x)^2} = \sqrt{\frac{1527}{2947} - (.1028)^2}$$

$$\sqrt{.518 - .01056} = \sqrt{.5074} = .71$$

$$\begin{aligned}\sigma'_y &= \sqrt{\frac{\sum fy'^2}{N}} = \sqrt{\frac{33540}{2947} - (.211)^2} \\ &= \sqrt{\frac{33540}{2947} - (.044521)} = \sqrt{11.38 - .044521} \\ &= \sqrt{11.3355} = 3.3\end{aligned}$$

Use the correlation formula which is set forth on page  
87. Refer to scatter-diagram on page 96.

$$\begin{aligned}\frac{4048 - (.1028)(.21)}{2947} &= \frac{1.37 - (.0216908)}{2.343} \\ \frac{1.34831}{2.343} &= .57 \quad r_{xy} = .57\end{aligned}$$

Take the assumed mean between 10-12. Midpoint is 11.  
Refer to formula page 85.

$$i = 3$$

$$c_1 = .3084$$

Mean = 11.30

In Y take the assumed mean between 61-65. Midpoint  
is 63.

c = .211

c1 = 1.055

Mean = 64.05

$\sigma'_x$  = .71

i = 3

SD = 2.13

$\sigma_y$  = 3.3

i = 5

SD = 16.5

TABLE XXIV  
SCATTER DIAGRAM FOR  
TEST II (SS)

	1-3	4-6	7-9	10-12	13-15	16-18	5 y	y'	$\sum y'$	$\sum y'^2$	$\sum X'$	y'-
86-90			2	48	76	23	144	+5	+745	3725	610	10
81-85			6	43	164	12	330	+4	+1320	5280	772	24
76-80			6	222	118	8	354	+3	+1062	3186	402	18
71-75		1	14	248	117	10	390	+2	+780	1560	274	32
66-70			27	276	68	9	380	+1	+380	380	86	27
61-65			43	224	44	3	314	0	+4287	0		
56-60			25	203	22	1	251	-1	-251	251	25	24
51-55			37	135	18	1	191	-2	-382	764	74	40
46-50		1	40	110	7	1	154	-3	-477	1431	126	27
41-45		2	44	76	5		127	-4	-508	2032	192	20
36-40		7	35	50	2	1	95	-5	-475	2375	245	20
31-35		4	29	34	1		68	-6	-408	2448	222	6
26-30	1	6	28	21			56	-7	-392	2744	301	
21-25	1	10	18	7			36	-8	-288	2304	328	
16-20		3	12	4			19	-9	-171	1539	162	
11-15	1	1	5	2			9	-10	-90	900	100	
6-10	1		4				5	-11	-55	605	77	
1-5	3	5	6				14	-12	-168	2016	300	
$\sum X$	7	40	381	1803	647	69	2947		-3665	33540	4296	-248 (4048)
$X'$	-3	-2	-1	0	+1	+2						
$\sum X'$	-21	-80	-381	0	647	138	+303	$\sum X'$				
$\sum X'^2$	63	160	381		647	276	1527	$\sum X'^2$				
$\sum X'y'$	216	578	1358	0	1712	432						
$\sum y'$		-4	107		115	-22					4296	248 (4048)

Reference is made to scatter-diagram of Test 1,  
Enlistee on page 99.

$$c'_x = \frac{\sum fx'}{N} = \frac{-73}{1077} = -.067$$

$$c'_y = \frac{\sum fy'}{N} = \frac{-235}{1077} = -.218$$

$$\begin{aligned} \sigma_x &= \sqrt{\frac{\sum fx'^2}{N} - (c'_x)^2} = \sqrt{\frac{453}{1077} - (-.067)^2} \\ &= \sqrt{.42 - (.004489)} = \sqrt{.415511} = .644 \end{aligned}$$

$$\begin{aligned} \sigma_y &= \sqrt{\frac{\sum fy'^2}{N} - (c'_y)^2} = \sqrt{\frac{12.267}{1077} - (-.218)^2} \\ &= \sqrt{11.38 - (.047524)} = \sqrt{11.33} = 3.36 \end{aligned}$$

Use the correlation formula set forth on page 87.

Refer to the scatter-diagram on page 99.

$$\begin{aligned} r_{xy} &= \frac{1243}{1077} - (-.067)(-.218) \\ &= \frac{1.15 - .014606}{(.644)(3.36)} \\ &= .53 \quad r_{xy} = .53 \end{aligned}$$

Take the assumed mean to be between 10-12. Midpoint  
is 11. Refer to formula page 85.

$$i = 3; \quad ci = 3 \times -.067 = -.201$$

$$\begin{array}{r} \text{Assumed mean is } 11.000 \\ \quad \quad \quad -.201 \\ \hline \end{array}$$

$$\text{Mean} = \frac{10.799}{\quad} \quad \text{Mean for years of school}$$

$$\text{completed} = 10.8$$

In Y, take the assumed mean between 61-65. Midpoint

is 63.

$$i = 5; c = -.218; ci = 5 \times -.218 = -1.090$$

Assumed mean is 63 (midpoint)

$$- \underline{1.090}$$

Mean = 61.910 or for practical purposes 61.9

$$\sigma_x = .644$$

$$i = 3$$

$$SD = 1.932$$

$$\sigma_y = 3.36$$

$$i = 5$$

$$SD = 16.80$$

**TABLE XXV**  
**SCATTER DIAGRAM FOR**  
**TEST I (ENL)**

	1-3	4-6	7-9	10-12	13-15	16-18	$\Sigma y$	$y'$	$f y'$	$f y'^2$	$\Sigma X'$	$y'$
86-90			1	18	21	5	45	+5	225	1125	155	5
81-85		1	1	79	24	8	118	+4	472	1888	180	12
76-80			3	88	20	2	113	+3	339	1017	72	9
71-75			8	92	18	1	119	+2	238	476	40	16
66-70			11	88	11		110	+1	110	110	11	11
61-65		1	12	75	4		47		+1384			
56-60		1	18	92	5		116	-1	-116	116	20	5
51-55		1	18	54	3		76	-2	-152	304	40	6
46-50			18	63			81	-3	-243	729	54	
41-45			30	36		1	67	-4	-268	1072	120	8
36-40		1	23	22			46	-5	-230	1150	125	
31-35		1	25	8			34	-6	-204	1224	162	
26-30	2	2	21	18	2		45	-7	-315	2205	217	14
21-25	1		2	2			5	-8	-40	320	40	
16-20		2	1				3	-9	-27	243	45	
11-15								-10	0	0		
6-10								-11	0	0		
1-5		2					2	-12	-24	288	48	
$\Sigma X$	3	12	192	735	118	17	1077		-1619	12267	1329	86 (1243)
$X'$	-3	-2	-1	0	+1	+2						
$\Sigma X'$	-9	-24	-192		+118	+34			$\Sigma f X' = 73$			
$\Sigma X'^2$	27	48	192		118	68			$\Sigma f X'^2 = 453$			
$\Sigma X' y'$	66	140	665		328	130				1329		
$-$		8	45		25	8				86		(1243)

Reference is made to scatter-diagram of Test 2,  
Enlistee on page 102.

$$c'_x = \frac{\sum fx'}{N} = \frac{-37}{940} = -.039$$

$$c'_y = \frac{\sum fy'}{N} = \frac{970}{940} = 1.03$$

$$\begin{aligned}\sigma_x &= \sqrt{\frac{\sum fx'^2}{N} - (c'_x)^2} = \sqrt{\frac{297}{940} - (-.039)^2} \\ &= \sqrt{.315 - (.001521)} = \sqrt{.313479} \\ &= .55\end{aligned}$$

$$\begin{aligned}\sigma_y &= \sqrt{\frac{\sum fy'^2}{N} - (c'_y)^2} = \sqrt{\frac{9978}{940} - (1.03)^2} \\ &= \sqrt{10.61 - (1.0609)} = \sqrt{9.5491} \\ &= 3.08\end{aligned}$$

Use the correlation formula set forth on page 87.

Refer to the scatter-diagram on page 102.

$$\begin{aligned}r_{xy} &= \frac{721 - (-.039)(1.03)}{940} \\ &= \frac{.767 - (-.04017)}{1.6940} \\ &= \frac{.80717}{1.6940} = .47; r_{xy} = .47\end{aligned}$$

Take the assumed mean between 10-12. Midpoint is 11.

Refer to page 85.

$$i = 3; c_i = 3 \times (-.039) = -.117$$

$$\text{Assumed mean} = 11.00 - .117 = 10.883$$



In Y, take the assumed mean between 56-60. Midpoint is 58.

$$i = 5; c = 1.03; ci = 5 \times 1.03 = 5.15$$

Assumed mean is 58

$$\begin{array}{r} \text{Mean} = \quad \quad \quad \underline{5.15} \\ \quad \quad \quad 63.15 \end{array}$$

$$\sigma_x = .55$$

$$i = 3$$

$$SD = 1.65$$

$$\sigma_y = 3.08$$

$$i = 5$$

$$SD = 15.40$$

**TABLE XXVI**  
**SCATTER DIAGRAM FOR**  
**TEST-II (ENL)**

	1-3	4-6	7-9	10-12	13-15	16-18	54	$y'$	$\sum y'$	$\sum y'^2$	$\sum X'$	$y'$
86-90				19	8	1	28	+6	+168	1008	60	
81-85			1	65	25	4	95	+5	+475	2375	165	5
76-80			3	68	20	1	92	+4	+368	1472	88	12
71-75			9	117	24		150	+3	+450	1350	72	27
66-70			7	102	9		118	+2	+236	472	18	14
61-65		1	11	71	7		90	+1	+90	90	7	13
56-60		1	13	58	9		81	0	+1787			
51-55			15	65	2		82	-1	-82	82	15	2
46-50			18	46			64	-2	-128	256	36	
41-45		1	19	30			50	-3	-150	450	63	
36-40			17	12			29	-4	-116	464	68	
31-35			15	16	2		33	-5	-165	825	75	10
26-30		2	14	9			25	-6	-150	900	108	
21-25			1				1	-7	-7	49	7	
16-20				1			1	-8	-8	64		
11-15								-9				
6-10								-10				
1-5		1					1	-11	-11	121	22	
$\sum X$	0	6	143	679	106	6	940		-817	9978	804	83 (721)
$X'$	-3	-2	-1	0	+1	+2						
$\sum X'$	0	-12	-143	0	+106	+12	-37	$\sum X'$				
$\sum X'^2$	0	24	143	0	106	+24	297	$\sum X'^2$				
$\sum Xy'$	0	52	342	0	350	60				804		
-	0	2	69	0	-12	0				83		(721)

# HOW DOES OREGON COMPARE WITH THE REST OF THE NATION IN ARMED FORCES QUALIFICATION TEST RESULTS?

The percent of rejections for failure to pass the Armed Forces Qualification Test by states for the period July 1950 to the end of June 1951 is set forth below (15, p.10):

1.3	Minnesota	10.7	North Dakota
1.9	Utah	10.8	New York
2.2	Oregon	11.8	Ohio
3.3	Idaho	12.9	Vermont
3.7	Massachusetts	13.9	Maryland
3.8	Washington	14.5	Missouri
4.2	Wisconsin	14.6	Delaware
4.7	Wyoming	14.6	Maine
4.8	Iowa	15.2	Arizona
4.8	New Hampshire	17.2	Oklahoma
5.1	Rhode Island	21.1	Texas
5.2	Illinois	21.8	West Virginia
5.2	Kansas	22.2	Kentucky
5.2	Montana	25.7	New Mexico
6.4	South Dakota	28.3	Florida
7.0	Indiana	28.9	Virginia
7.0	Pennsylvania	30.2	Georgia
7.1	California	34.6	North Carolina
7.6	Nebraska	36.4	Tennessee
8.1	Colorado	38.7	Louisiana
9.1	Connecticut	39.2	Alabama
9.2	Nevada	39.2	Arkansas
9.8	Michigan	40.4	Mississippi
10.6	New Jersey	56.0	South Carolina

A survey made of 8089 cases, which was discussed in detail in the last chapter showed the following:

Test 1	(SS)	Mean AFQT	62.85	Mean of schooling	11.15
Test 2	(SS)	Mean AFQT	64.05	Mean of schooling	11.30
Test 1	(ENL)	Mean AFQT	61.90	Mean of schooling	10.80
Test 2	(ENL)	Mean AFQT	63.15	Mean of schooling	10.88

In the preceeding chapter it was shown that the coefficient of correlation varied from .47 to .57. The

coefficient for each test and the group to which it was given is as follows:

AFQT 1	(Selectees)	Coefficient of correlation	.56
AFQT 2	(Selectees)	Coefficient of correlation	.57
AFQT 1	(Enlistees)	Coefficient of correlation	.53
AFQT 2	(Enlistees)	Coefficient of correlation	.47

This correlation showed the comparison between the AFQT scores and the number of years of school completed. It was shown that there was a moderate correlation and a substantial relationship between AFQT scores and academic achievement.

During the period July 1950 to the end of June 1951, Oregon ranked third in the Nation with only 2.2 percent failures on the Armed Forces Qualification Test (15, p.10). Only two states, Minnesota and Utah, had better records than Oregon. The national average during this time was 16.4 percent.

What factors have contributed or been responsible for Oregon's outstanding record in regard to the mental rejection rate on the Armed Forces Qualification Test? Checking further, it was found that in 1950 only one state Iowa had a lower percentage of the adult population with less than five years of schooling. The Oregon percentage was 4.3, while that of Iowa was 3.9, while the Nation as a whole had a percentage of 11. Oregon did not do as well in the comparison of the percentage of the adult population with four or more years of college, ranking

fifteenth, with a 6.6 percentage (18, p.12).

Oregon ranked eleventh in the smallness of its pupil load per teacher, third in per capita expenditure for education, fifth in average expenditure per pupil, fourth in median expenditure per classroom, fifth in the percentage of its school age children in school (18, p.12). The Oregon record leaves much to be desired in respect to teacher education. A high 43 percent of Oregon elementary teachers have less than four years of college preparation. The national average is only 31.8 percent. Plans to correct this deficiency are already underway.

In the overall picture, Oregon compares most favorably with the rest of the Nation. This generally favorable educational picture has reflected itself in the manner in which Oregon Selectees and Enlistees have performed in the Armed Forces Qualification Test.

In World War II, the number of white registrants rejected for mental deficiency showed Oregon second throughout the Nation with the number 800, and the rate per thousand of 5 (12, p.51). The number of non-white registrants rejected for mental deficiency totalled less than 100 and no rate per thousand was given (12, p.53).

IS THERE A SIGNIFICANCE BETWEEN PHYSICAL  
AND MENTAL REJECTIONS?

One out of every three men currently processed for military duty under Selective Service regulations is disqualified (5, p.11).

According to the Office of the Army Surgeon General, approximately 3,900,000 pre-induction examinations were given to Selective Service Registrants from the beginning of the Korean conflict in July 1950 through December 1953. About 1,250,000 of the men examined were disqualified.

The total disqualification rate during this period was 32.4 percent, broken down as follows: 15 percent were turned down for medical reasons; 13.4 percent failed the mental examination; 3.2 percent failed both mental and medical examinations; and 0.8 percent were not acceptable for administrative reasons (criminal records, moral and other reasons) (5, p.11).

The principal disqualifying medical defects based on a sample of medical records of men found not acceptable for the period July 1950 through December 1951, revealed the following diagnostic breakdown:

Circulatory system diseases.....	15.5%
Bones and organs of movement diseases and defects.....	14.7
Psychiatric disorders.....	12.8
Digestive system diseases and defects.....	10.5
Eye defects.....	7.6

Ear and mastoid process defects.....	6.4%
Allergic diseases.....	5.8
Congenital malformations.....	4.4
Infective and parasitic diseases.....	3.3
Failure to meet height and weight standards.....	2.7
Neurological diseases.....	2.5
Neoplasms (tumors, etc.).....	2.5
Skin and cellular tissue diseases.....	2.1
Endocrine system diseases.....	1.6
Respiratory diseases.....	1.3
Genito-urinary system diseases.....	1.1
Blood and blood forming organ diseases.....	0.2
Metabolic and nutritional diseases.....	0.1
Miscellaneous diseases.....	4.9

States having the highest disqualification rates for mental, physical and other deficiencies from July 1950 through June 1953 were: South Carolina, Mississippi, Louisiana, Alabama, and Arkansas. Lowest rates for this period were experienced by Minnesota, Kansas, Utah, Iowa, and South Dakota (5, p.12).

In connection with the survey made on 8089 cases, it was confined to just Selective Service Registrants in the matter of rejections. Generally speaking, men do not volunteer for enlistment unless they are reasonably certain they are in good condition. Also, if a man wishes to enlist, but there is some factor which would bar him from serving, he does not go through the processing. However, with Selective Service, the law requires that every Registrant be given a complete processing, and this is done to prevent difficulties and confusion of a potential nature

from developing at a later time. For the above reasons, this chapter has been limited to just Selective Service Registrants, or a total of 6072.

In connection with AFQT-1 (Selective Service), it is noted that in this survey there were 383 "physical rejects." What kind of scores did these men make? What percentage failed both the physical and the mental examination? How does this compare with the overall percentage of those who failed the mental examination?

This will be set up in groups; Group I being equivalent of the old Army General Classification Test Group I which was from 130 upward; Group II, from 110-129; Group III, from 90-109; Group IV, from 65-89; and Group V, from 65 downward.

Group I.....	12.27%
Group II.....	42.30
Group III.....	29.50
Group IV.....	12.81
Group V.....	3.13

It is interesting to note that on AFQT-1 given to Selective Service Registrants, 3.13 percent failed both the physical and the mental test. On page 41 of this thesis, it is shown that the overall percentage failing the test amounted to 3.2 percent. This would indicate that 94 percent of those who fail the physical examination also failed the mental examination, or AFQT-1.

In regard to AFQT-2, it is found that there were



359 physical rejects. This test will also be set up in the manner of groups as was done above.

Group I.....	19.53%
Group II.....	36.49
Group III.....	27.30
Group IV.....	14.21
Group V.....	2.50

On AFQT-2, 2.50 percent failed both the mental and the physical examination. On page 42 of this thesis, it is shown that the overall percentage failing the test amounted to 2.91. This would indicate that 86 percent of those who fail the physical examination also failed the mental examination, AFQT-2.

These percentages seem significant, and lend credence to the statement that failure on a test such as the AFQT is influenced to a great extent by physical condition, and that failure may not be entirely due to mental deficiencies or limitations, but may be due to physical factors.

## WHAT IS THE NON-LANGUAGE TEST?

The "NQT" as it is generally known is a non-language test. It was developed and put into use when it was discovered throughout the Nation that so many Selective Service Registrants did not possess a fourth-grade reading ability. It is given to those who fail the Armed Forces Qualification Test. The directions are given in pantomime or sign language. It is composed of pictures, some alike and some similar. This test might also be called a recognition test. The Non-Language Test is valuable in that it indicates for a man who has failed the AFQT if he has greater potential ability than he displayed while taking the AFQT. It also serves the purpose of indicating those who are illiterate--high mental, those who are illiterate--marginal mental, and those who are mentally unacceptable. It is also an important tool to use with those who are malingering.

Non-verbal tests have not been widely used in this country. It is indeed rare that one has occasion to test a group which is linguistically handicapped. Such situations do arise in the military processing of illiterates.

The most widely known non-verbal test is the Army Beta which was used in World War I for those cases in which the verbal test, Alpha, was considered inappropriate. Directions were in pantomime, which removed the effect of

differences in language ability from the score. In World War II, the Group Target Test filled the same function (8, p.187).

This Non-Language Test has all the virtues and all the weaknesses characteristic of non-verbal tests. Development of non-verbal tests has been hampered by the difficulty of eliminating language completely, since directions in most tests of this sort are difficult to pantomime. Another is that most non-verbal items do not call for very complex mental processes. With the exception of spatial items which measure ability to perceive relations among forms, most non-verbal items are too easy to measure superior adolescents and adults (8, p.188).

The Non-Language Test serves the useful purpose of high-lighting those men who failed the test (AQFT) through carelessness or by being in too much of a hurry. The percentage of men who are found acceptable fluctuates greatly. For those men who are from the state of Oregon, the percentage of acceptables runs high; for those men who are from other states transferred into this state, the percentage runs very low. This once again puts into focus the educational opportunities to which the men have been exposed.

It is interesting to note that men who failed the AFQT and who failed the Non-Language Test have done

correspondingly poor work on the California Maturity, the Wechsler and the Stanford-Binet.

## CONCLUSIONS AND RECOMMENDATIONS

The outstanding finding that emerges from the AFQT results is the magnitude of the problem which the illiterate and poorly educated present. During the eighteen months from July 1950 through December 1951, just over two million Selective Service Registrants were examined for induction. Of this number 1,300,000 were accepted and slightly more than 700,000 rejected. More than half of those rejected, 54 percent had failed to pass the mental examination called the Armed Forces Qualification Test (AFQT). Some of those who failed were disqualified not only for this reason but because they had not met the physical or emotional standards. Just under one out of every five Registrants failed the AFQT (12, pp.204-205).

The AFQT revealed a wealth of information concerning the literacy of a large segment of our population, and it may be said to be a reasonably good instrument for discerning how literate people will do in certain types of Army training. It will not help at all in estimating the performance of an illiterate or poorly educated man (2, p.219).

This is borne out by the high rejection rates in the counties in southern Texas in which the predominant language is Spanish rather than English. A similar condition holds true in the northern parts of Maine,

New Hampshire and Vermont. A large number of French Canadians with an inability to read and understand English live in that area (12, pp.44-45). The AFQT is based on the premise that a person has a fourth-grade reading ability in English.

As in World War II, the largest number of men rejected for mental and educational reasons came from the Southeast. Of the 392,000 who failed the examination during this eighteen-month period, 213,000, or 54 percent were resident in that area (12, p.205). In addition to factors which are usually associated with low educational level such as rurality, isolation, and high percentage of Negroes in the population, one other crucial factor must be included. This is the educational system, which is a reflection of the economic base on which it rests; where the base is weak, so is the system (12, p.186).

Because of the tradition in this country of local control of education, the states and local communities have a heavy responsibility, both in the matter of eradicating illiteracy and in preventing it through the improvement of educational conditions for the children. Adult illiteracy results from many causes. One is the lack of school attendance. Because of the lack of enforcement of compulsory school attendance laws there are hundreds of thousands of children of school age not in school or who

attend so irregularly as to make their learning amount to practically zero (6, p.132). Similarly, another cause is pupil mortality. As indicated by grade distribution studies and by educational attainment data from the Census Bureau, a large percentage of pupils who enter the first grade drop out--never to return--before they reach the fifth grade. The Armed Forces and the Census Bureau have confirmed what is generally known, that many of these drop-outs revert to a state of illiteracy. Poor teaching is another cause of illiteracy. There are known cases of normal children who are advanced from grade to grade--even as high as seventh, eighth, and ninth grades--who for all practical purposes are functionally illiterate (6, p.133). In a survey conducted by the National Education Association of the United States, "Educational Differences Among the States," it is found that states with high percentages of failures on the Armed Forces Qualification Test also had unfavorable educational pictures in regard to the following: pupil load per teacher, number of days of school attendance, amount of money spent per pupil, teacher educational qualifications, school age students in school, and salaries.

In a survey made of 8089 cases, both for Selectees and Enlistees, the mean of education for each group here in Oregon is as follows:

AFQT 1 (Selective Service)	11.15
AFQT 2 (Selective Service)	11.30
AFQT 1 (Enlistee)	10.80
AFQT 2 (Enlistee)	10.88

Oregon as indicated earlier ranked third in the Nation with a rejection rate on this test of only 2.2 percent (15, p.10).

In Tables III, IV, V and VI, on pages 41, 42, 43 and 44, it is shown that as the years of schooling increase, the percentage of failures per grade decrease. With additional years of educational accomplishment, there is an increase in the mean (average score) made on the Armed Forces Qualification Test. This condition holds true for both Enlistees and Selectees.

Figure 1 on page 66 shows that for grades on through six, no one falls in the percentile range 50-100. Also on page 66 it is shown that 1.73 percent of those with seven years of schooling are found in the 90-100 percentile. On page 67, 18.88 percent with twelve years of schooling are found in the 90-100 percentile.

An examination of the Charts from pages 65-80 shows that as the years of education increase, there follows an increase in the percentages in the higher percentile categories. These figures add further impact to the findings presented on page 104 of this thesis, that there is a moderate correlation and a substantial relationship



between AFQT scores and years of school completed.

There are those who advocate that the Army and all the Services should take men who are illiterate and they should be given their basic education along with their basic military training (12, p.67). The Army found it necessary to establish in World War II a special training program because of the deficiencies in educational opportunities that had been available to young men when they were growing up. This is an example of the inevitable continuity in social life in which advantages of errors of the past have a marked influence and bearing upon the opportunities and limitations of the present (12, p.72). The success of the program can not be denied. Seventy-six percent of the Special Training Unit graduates received favorable discharges, that is, they were discharged at demobilization, or for re-enlistment, or were killed in action, etc (12, p.97).

However, in spite of their reluctance to do so, out of necessity in World War II, the Armed Forces had to develop a literacy program of their own. Unless steps are taken by civilians immediately to meet the problem, the Armed Forces will again be required to divert much of their time, energy and personnel from their primary task of defense to that of teaching illiterates. From a defense standpoint, the present leadership directly concerned with the problem

in the Department of Defense and in Selective Service is in favor of civilians doing the job before induction (6, p.132).

In connection with the problem, the following report, received from James S. Miles, Major, Infantry, PRO, Hq, Fort Lee, Virginia, is of more than passing interest (4, pp.348-349):

Recruits being inducted into the Army at the Quartermaster Center, Fort Lee, find that as pre-requisite to their military training the three R's are a lot more important than the ability to distinguish their left foot from their right.

With draft laws in effect throughout the United States, the Army is discovering that a considerable number of personnel have been brought into the service who are unable to absorb training because of their inability to read and write English and to do simple arithmetical problems. Illiteracy is not the only problem that the Army has to face. Many of the recruits have just arrived from foreign countries and have little or no knowledge of the English language.

For those and for those men who have not had the opportunity for a formal education, or also have not taken advantage of the opportunity, the Army I & E Section has instituted a basic education program designed to relieve that condition. At Fort Lee, the I & E Office conducts on duty classes, enabling the men to meet the Army's minimum educational requirements.

Classes are held either morning or afternoon, Monday through Friday, for a period of four hours a day over a period of 25 days. At the end of this time the students take a United States Armed Forces Institute examination that covers their period of instruction. At

the successful completion of the course recruits are awarded a certificate and appropriate entry is made in their military record.

When instructors are confident that individual students will make sufficient progress to justify additional instructional time, these individuals may be returned to classes for additional class work as may be necessary to meet the Army's minimum educational requirement.

Only top instructors are selected to give the instruction in the basic subjects, reading, writing and arithmetic. Instructors are all state certified teachers and experienced in adult educational problems.

Some idea of the vastness of this program may be grasped from the statistics of an experimental period of this type of education conducted at Fort Lee from April 1 to October 13, 1952.

More than 900 recruits were given an elementary knowledge examination, and of that number 459, approximately half failed to pass the test. After 100 hours of instruction 391 students were tested. Of this total, 255, or 65.2 percent passed; 136, or 34.8 percent failed.

An additional 68 students were given 200 hours of instruction and then tested. Of these 42, or 61.7 percent successfully completed the examination, while 26, or 38.3 percent failed. The 26 who failed the course were declared ineducable and will probably be released from the Army under a general discharge.

An overall figure on the experimental group reveals that, of the 459 tested originally, 64.7 percent passed the course and 35.3 percent failed.

It is important to bear in mind that this Fort Lee experiment was taking place during the middle of the

Korean conflict. Once again, the Services were receiving men without the basic fundamentals to carry on their military duties.

The Office of Education, the State Department of Education, local school systems, other government agencies, and private educational institutions working co-operatively can solve this problem, both its immediate and urgent mobilization aspects as well as its long term aspects, if given the opportunity and the proper support. And it can be done with considerable saving and cost to the taxpayer (estimated at one-sixth or one-seventh of what it costs after induction) (6, p.132).

The states and local communities can do more toward providing classes for illiterates and in stimulating them to attend the classes. According to an Office of Education study, it was estimated that fewer than 30,000 native born illiterates were enrolled in public school classes in 1949-1950, which is approximately only one percent of the total number of illiterate adults in the United States (6, p.133).

Institutions of higher learning can assume greater responsibility in providing well-qualified teachers and suitable materials for adult illiterates. The Office of Education, through a special literacy project, has developed some "knowhow" in this field. The financial assistance given this project by the Carnegie Corporation

of New York indicates ways in which private philanthropy may continue to make a significant contribution to the solution of one of our most difficult national problems (6, p.133).

The problem of illiteracy has many facets. Its solution, therefore, must be reached through many approaches. Too often in the past, efforts in this field met with failure because the same materials and methods used in teaching children were used with adults. The result was a lack of interest, lack of motivation, and lack of learning on the part of the adults. Since literacy training was not geared to the learner's needs and background in general, nor to their experiences in particular, they soon dropped out. Another difficulty has been the lack of mature teachers who understand adult interests and needs, and who can approach adults with an adult psychology. Still another difficulty has been that of arousing community-wide concern which will assure organizational and financial support, and make adult literacy education popular (6, p.133).

It should be emphasized that the responsibility of meeting the problems of illiteracy belongs to the local communities. But where they are not able to meet them alone, it is the responsibility of the states to assist. Private individuals, school officials, and committees can

find many ways to attack the problem if they make a vigorous and co-operative effort to do so. There is also much that can be done and should be done on the national level. The promotion of literacy education will not only contribute to our mobilization effort and to the general welfare, but it will also aid in providing the kind of international leadership that the world needs today. This is particularly true with respect to providing leaders in fundamental education and in our technical assistance program, and in meeting such requests from the under-developed countries throughout the world. In the kind of technological and ideological conflict in which this country is engaged, literacy among our own citizens, as well as among the peoples of the world is a must (6, p.133).

Soviet Russia has apparently made substantial strides within its own borders in eradicating illiteracy and it uses this progress as a major weapon of propaganda. Furthermore, the Communists have repeatedly called attention to the fact that our country which boasts about its standard of living still has a considerable number of illiterates in its population. Here is a vital reason for national concern with the problem (12, p.231).

It is hoped that this study has presented the problem as it was revealed by the Armed Forces Qualification Tests. Samuel Butler many years ago stated, "Every man's work is

always a picture of himself."

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