CHAPTER 2
THE NATURE OF APTITUDE AND
THE GENERAL APTITUDE TEST BATTERY

Definition of Aptitude

The term "aptitude" has many connotations and definitions. The term is generally used loosely by laymen and psychologists. And, as is often the case with "intangibles", the definition of aptitude is highly subjective.

The term aptitude is used in the positive and the negative sense. In the positive sense it is generally said that a man has a great deal of aptitude for, say music, which means that he has in a high degree several characteristics which make him a successful musician. In the negative sense, it indicates a person's lack of any special aptitude. In the former case aptitude denotes a combination of traits and abilities, while in the latter case it conveys a discrete, unitary characteristic.

Thus counsellors and personnel men think of aptitudes which make for success in vocations and jobs, while psychologists think of individual differences in traits, and therefore, use this term in a narrow scientific sense (Super and Crites, 1962). Since psychological tests grew out of the study of individual differences, most of the aptitude tests measure the discrete, unitary, narrow but scientific characteristics of the aptitude.
The most popular definition of aptitude representing a broad, umbrella-type approach has been subscribed to and adopted by Walter Van Dyke Bingham. Before his death, Bingham was the leading authority in aptitude measurement, even though Hull (1928) published his book on aptitude testing in 1928. In *Aptitudes and Aptitude Testing* (Bingham, 1942), he cites the definition given in Warren's *Dictionary of Psychology* (1934) — a condition or set of characteristics regarded as symptomatic of an individual's ability to acquire with training some (usually specified) knowledge, skill, or set of responses such as the ability to speak a language, to produce music etc., and bases his theory on it.

The use of the term condition in the definition indicates that the "real" nature of aptitude is not very clear. "Set of characteristics" implies that aptitude is not necessarily an entity, but a constellation of entities. Gekoski (1964) has shown that a set of characteristics may include, among many things, intelligence, interest, personality, special abilities, and attitudes. Such a package approach to aptitude raises an interesting point. It follows from this approach that there is no such thing as "aptitude test". If aptitude comprises these components, then aptitude tests should measure all of them. Yet no one test measures all these components.

Another problem in the package approach to aptitude is whether to contemplate the relative independence of these components from one another. If a person's aptitude is the net result of these components, then they
must be reasonably interrelated. It follows from this logic that intelligence is related to personality, interest is related to special abilities and vice-versa. However, published researches reveal that these components are not interrelated. We know that one individual can be bright yet be dominant or submissive, another can be dull and be interested or disinterested in listening to music, and yet another can be interested in listening to music and be good or poor with numbers.

Freeman's definition of aptitude is very close to Warren's. "An aptitude is a combination of characteristics indicative of an individual's capacity to acquire (with training) some specific knowledge, skill, or set of organized responses, such as the ability to speak a language, to become a musician, to do mechanical work. An aptitude test, therefore, is one designed to measure a person's potential ability in an activity of a specialized kind and within a restricted range" (Freeman, 1962, p. 431). Freeman also talks about a "combination of characteristics" which is similar to Warren's "set of characteristics". However, when Freeman talks about aptitude tests he probably has the unitary nature of aptitude in mind.

Guion believes that "aptitude for any line of work can be considered in terms of three major categories: (1) intellectual abilities, (2) physical traits, including psychomotor abilities, and (3) motivational traits, interest, aptitudes, or temperament needed for persistent and attentive effort." (Guion, 1965, p. 213). He further states, "Within each of these
categories, one may seek highly specific measures of aptitude, or he may 
consider aptitude within any one of them to be highly generalized" (p.21).
Thus Guion may call even a measure of interest or attitude as aptitude 
measure. Guion's stand is quite similar to that of Wesman who says that 
achievement tests can also be called aptitude tests (Wesman, 1968).
Guion also agrees with Bingham in including interest in aptitude. Interest­
ingly, although Guion has mentioned three major categories of aptitude, 
he conceives aptitude more in terms of intellectual abilities than other 
aspects, because all aptitude tests - specific and multiple aptitude 
batteries - are discussed by him under the heading, Measures of Specific 
Intellectual Abilities. Also he probably considers all intellectual 
abilities as a group of cognitive aptitudes. However, Guion is not very 
clear whether aptitude is a combination of abilities and traits or a 
discrete, unitary characteristic.

Harriman in his Dictionary of Psychology defines aptitude as "a capacity 
in any given skill or field of knowledge, on the basis of which a predic­
tion may be made regarding the amount of improvement which further train­
ing might effect (Harriman, 1952, p. 31-32). His definition is differ­
ent from the others given above. He has not used the words "conditions", 
'set of characteristics", or "combination of characteristics".

All the definitions quoted above and particularly the one quoted by 
Bingham show a particular bias towards an applied, technological usefulness 
of psychological tests, especially their counselling uses. Bingham
writes: "The obvious main function of standardized tests of aptitude is to help in estimating the probabilities that a person would be able to follow successfully an occupation he is considering. Related uses are to discover unsuspected talents; to suggest possible alternative fields; to bring to attention endowments which might well be capitalized, and disabilities which should be recognized and removed or compensated for; and in general, to provide the inquirer, whether youthful or mature, with food for objective thinking about himself and his future relations to the world or work" (Bingham, 1942, p. 14). The counsellor or the personnel man generally favours this approach in defining aptitude.

The psychologists' and test researchers' definition of aptitude is best represented in Super's definition of aptitude. Dismissing Warren's definition and the definition given by English and English (1958), Super defines aptitude as "Psychological factors, each relatively stable, unitary, and independent, which contribute in varying degrees to success in varying occupations" (Super, 1957, p. 198). At another place Super writes "scientific definition of aptitude would provide for specificity, unitary composition and the facilitation of learning of some activity" (Super and Crites, 1962, p. 71). Aptitudes, according to him are potential capacities, which enable one to learn. Thus a person with a high aptitude for science can master any of its branches easily.

But the third characteristic which Super ascribes to aptitude, viz., unity and independence, poses problems of which Super is aware. He
writes: "Although aptitudes have been defined as unitary and independent, this does not mean that scientific developments have made it possible to measure one aptitude or factor without having that measure contaminated by other factors. For example, tests of verbal reasoning require that the examinee be presented with verbal material with which to reason, and such material can be presented only visually or orally, and be received only by seeing it or hearing it. To see it the examinee must read, which means that a reasoning score he makes is affected to some extent by his reading skill" (Super, 1957, p. 199). He further cites an example of the Bennett Mechanical Comprehension Test which is generally assumed to measure a spatial aptitude, and yet the mechanical information and ability to visualize space relations play a major role in it. He concludes "... for most practical purposes it is still true that the most valid current tests are those which do not stress the unitary nature and purity of aptitudes or traits measured" (Super and Crites, 1962, p. 72).

This discussion of the definition of aptitudes can be concluded by citing one more definition which reconciles both these approaches satisfactorily. "Aptitude is a person's capacity, or hypothetical potential, for acquisition of a certain specific and more or less well defined pattern of behaviour involved in the performance of a task with respect to which the individual has had little or no previous training" (Michael, 1960, p. 60).
The Nature of Aptitude

The endowment of aptitude varies from person to person. It is a dimensional concept and not a categorical one. When we say that a person does not have an aptitude, we do not mean that he has no aptitude at all. The correct statement would be that he has a very little aptitude, but nevertheless has some.

In a selection situation, we accept that all applicants have an aptitude for that position. We accept, however, that they differ in the degree to which they possess the aptitude. The selectors must identify a person whose aptitude for that job is highest.

A crucial question in dealing with the nature of aptitude is whether it is innate or acquired? According to Bingham (1942) the definitions of aptitude do not suggest whether aptitude is innate or acquired. Too often it has been implied that "aptitude" refers only to a person's inborn endowments. Bingham considers this as a 'mistaken view' and maintains that a person's potentialities are quite certainly the products of interaction between conditions both innate and environmental. According to him it is futile to explore innateness vs. acquiredness, because that does not help us in any way. We want the facts about a person's aptitude as they are at present: Characteristics now indicative of his future potentialities. Whether he was born that way, or acquired certain characteristics later in infancy or adulthood is of little practical concern.
While Bingham does not make a categorical statement about the innateness or acquiredness of aptitude, Super (1957) believes that aptitudes are to some extent inherited, although he adds that experience contributes to their development in infancy and childhood.

Freeman (1962) answers this question from a different angle. According to him when we speak of a person's aptitude for any activity, we do not consider the degree of its innateness or acquiredness. When clinicians, guidance personnel or personnel men give aptitude test to the clients, they cannot ignore a person's past experience in evaluating his performance. Freeman further argues that aptitude is measured through the tests and whether it is innate or acquired depends upon the nature and the content of the tests. This point needs to be clarified.

Super distinguishes between miniature aptitude tests and abstract aptitude tests (Super and Crites, 1962). In the miniature test, the task in which learning or success is to be predicted is reproduced in a miniature and simplified form. For example, one method of measuring mechanical aptitude is through a mechanical assembly test, utilizing various common objects such as screwdrivers, nails, etc. It is likely that a candidate who has manipulated such objects will achieve a higher score than one who has not. In the test of abstract reasoning, on the other hand, the job has been analysed and one or more of its essential characteristics has been abstracted and put into test form. In this type of test, the
previous experience is of little help, and candidate's score will largely depend on his inherited qualities.

Thus, the foregoing discussion suggests that aptitude is neither completely innate nor completely acquired. Thorndike and Hagen state this point aptly: "Aptitude depends in unknown proportions, on the genetic characteristics of the individual and his whole life history of physical surroundings and previous learnings" (Thorndike and Hagen, 1970, p. 644). However, most definitions place little importance on training or experiences.

Linked with the innateness or acquiredness of aptitude is its constancy. Super maintains that aptitudes are stable, an extension of his belief that aptitudes result to some extent from inherited characteristics. Bingham also, without being clear on the innateness or acquiredness of the aptitude says that differences in aptitudes are relatively stable. Super writes: "If behaviour or success is to be predicted, the entity upon which the prediction is based should be relatively stable. An aptitude which varied irrationally from one day, month or year to the next would not provide a sound basis for predicting achievement at some future date" (Super and Crites, 1962, p. 72). Aptitudes are crystallized in infancy and childhood and are stable during the adolescent and adulthood. "They may be affected by drastic experiences, but can otherwise be thought of as not being appreciably affected by education, special training, or experience. Specific practice on the test itself will raise the subject's
test score, but that does not indicate a change in the degree of aptitude" (Super and Crites, 1962, p. 73).

Aptitude Related to Ability, Skill and Proficiency

Ability: Ability is frequently confused with aptitude. Ability refers to a more general trait in an individual which has been inferred from certain response consistencies to certain tasks. Thus according to some psychologists, ability includes aptitude and achievement (Thorndike and Hagen, 1970). Bingham (1942) uses the term in its broadest sense as connoting power to perform designated responsive acts without implying whether this power is potential or actual, native or acquired. According to Fleishman (1964), abilities are a product of learning and develop at different rates mainly during childhood and adolescence. Some abilities, e.g. colour vision, depend more on genetic than learning factors, but most abilities depend on both to some degree. Super and Crites (1962) use ability to include aptitude and proficiency.

In short, ability may be viewed as the current performance of an individual on any task near his maximal level of motivation - a task with respect to which he had had a limited amount or more or less loosely structured experience. Ability refers to what a person can do today. It is the power, at a given time, to perform acts or skills. An ability test should reflect the existence of a greater amount of experience of formalized training in that field than the aptitude test.
Skill: Skill is the ability to perform an act with ease and precision. Proficiency in flying an airplane, typing, or in playing cricket refers to specific skill. Thus acquiring skill in operating a typewriter connotes that the typist perfected the sequence of responses required by typing. According to Fleishman (1964), the skill involved in complex activities can be described in terms of the more basic abilities. For example, typist's level will depend on his basic abilities, viz., manual dexterity and motor coordination. Skill level is not stable or constant.

Proficiency is synonymous with skill but a little more than skill. It denotes the mastery acquired in an activity. Proficiency includes skills not only in motor and manual activities, but also in other cognitive activities, such as one's skills over language or any discipline. The term is almost synonymous with achievement test.

The General Aptitude Test Battery

The General Aptitude Test Battery (GATB) has been constructed and standardized by the occupational analysis and testing division of the United States Employment Service, USES in 1947. (Dvorsk, 1947; 1956; 1960; 1965a; 1965b; and 1965c).

The GATB resulted not only from the theoretical developments in the mental ability research and practical exigencies of counsellors and personnel men but also from the economic problems of the U.S. in 1930s. Immediately after World War I U.S. faced acute and unprecedented economic
depression which resulted in the widespread and massive unemployment. It faced two problems: To find or create jobs for those unemployed and to find suitable persons for the various jobs available. One of the steps the U.S. Government took was forming with the enactment of the 1933 Wagner-Peyser Act on July 1, 1933, the United States Employment Service (USES) to provide a unified national public employment service. William H. Stead was the director of USES. The occupational analysis and industrial service division was established to make a comprehensive study of job and workers from which emerged several tests for selection of personnel. Because of the large number of available tests, two questions arose: What were the basic aptitudes being measured? and Which tests were best measures of these basic aptitudes?

**Factor Analysis of Existing Aptitude Tests**

To answer these questions, factor analytic studies were conducted during the period 1942 to 1944. Of the 59 tests that were analyzed, 54 representative tests were selected from the approximately 100 USES tests. The other five tests were the O'Rourke Survey Test of Vocabulary (Form X/), the Revised Minnesota Paper Form Board (Likert and Quasha), the Minnesota Spatial Relations Test, the Minnesota Manual Dexterity Test - Placing, and the Minnesota Manual Dexterity Test - Turning.

Several experimental batteries incorporating these tests were administered to a total sample of 2,156 males between the ages of 17 to 39.
years from 12 geographical locations. To facilitate factor analysis, the total sample was divided into nine groups of persons varying from 98 to 1,079 and administered 15 to 29 tests.

Identifying the Factors

Thurstone’s methods of factor analysis were employed to obtain a meaningful structure of underlying aptitudes. The smallest number of common factors established for any group was seven and the largest was 10.

In all, eleven different common factors were found. They were named as follows:

G - Intelligence  A - Aiming
V - Verbal Aptitude  T - Motor Speed
N - Numerical Aptitude  F - Finger Dexterity
S - Spatial Aptitude  M - Manual Dexterity
P - Form Perception  L - Logic
Q - Clerical Perception

Factor L was found only in two of the nine studies, and hence was dropped from further consideration.

Forming the Test Battery: First Edition of 1947

After the factor analysis was completed, tests were selected for inclusion in an aptitude battery designed to provide separate measures for each of the 10 aptitudes that were factorially established. These tests were selected on the basis of two criteria:
1. **Internal or Factorial Validity**: The size of the factor loading of a test evidence the validity of the test with respect to the factor measured. Since the size of the loading of a given test on a given factor, varied marginally for each study, the estimated factorial validity of each test was determined on the basis of a comparison of the factor loadings in the various studies in which both the test and the factor appeared.

2. **External or Practical Validity**: This was determined on the basis of a review of the demonstrated relationship between each test and concrete criteria obtained in a variety of occupational validation studies. High correlation with external criteria of success for a number of jobs is an evidence of broad practical value of the test as used in actual prediction.

The application of these two criteria resulted in the selection of 11 paper-and-pencil and four apparatus tests for inclusion in the first edition of the General Aptitude Test Battery, B-1001 which was published in 1947. The total time taken for the entire battery was about 2.5 hours in which it was possible to measure all the major abilities represented in the repertoire of USFS tests.

The factor loadings assigned to 15 finally selected tests for GATB were the typical loadings obtained for these tests from all the factor analysis studies in which these tests had been included.
A multiple factor loading was computed for each factor measured by more than one of the 15 selected tests by applying the Wherry-Doolittle Test Selection Method to the test intercorrelations from a sample of 519 employed workers and to the factor loadings of the tests measuring the factor. A single factor loading represents an estimate of the internal or factorial validity of a single test for the factor measured by it. In the same sense, a multiple factor loading represents an estimate of the factorial validity of the best weighted composite of two or more tests for the factor measured in common by these tests (Chapter 5).

Later Editions of the GATB B - 1002 A and B - 1002 B

Steps were taken later to develop a separate-answer-sheet form of the GATB. The old test items were put in the multiple test form and adapted for use with a separate sheet. Many new items were constructed. The old and the new items were arranged in order of difficulty and tried experimentally.

These were administered untimed to a total of 100 samples, ranging in size from 196 to 236 examinees who included local Employment Service Office Applicants, high school juniors and seniors, college sophomores and juniors, commissioned and non-commissioned officers in the U.S. Air Force, business women's clubs, and civic luncheon groups. Data were analysed to determine the difficult level and the diagnostic value or discriminating power of each item. The best items were selected. Time...
limits were set, answer sheets were put in the final form, and directions for administration and scoring the tests were prepared. Two alternate forms, A and B, were developed with reusable booklets and separate answer sheet. These are known as B-1002 A and B-1002 B.

Aptitudes A and T of GATB B-1001 were consolidated into a single measure called "Aptitude K - Motor Coordination" in GATB B-1002. Similarly Tests C, G and F of B-1001 were eliminated while forming B-1002. Reasons and justifications are given in the manual for General Aptitude Test Battery, Section III: Development (U.S. Department of Labour, 1970a).

Aptitudes Measured and Tests included in Forms B-1001 and B-1002

Tests in B-1002: The GATB B-1002, comprises 12 tests measuring nine aptitudes. Eight are paper-and-pencil tests and four are apparatus tests. Two apparatus tests (Parts 9 and 10) use the peg-board and the other two (Parts 11 and 12) use the finger dexterity board. Approximately 2½ hours are required to administer the entire GATB-B-1002.

Alternate Forms: An alternate form is available for each separate-answer-sheet test in B-1002, Parts 1, through 7. The two forms have been designated A and B. They are comparable in the types of tests included and the nature of the aptitudes measured. They differ only in the specific sampling of items in Parts 1 through 7. Parts 8, 9, 10, 11, and 12 are identical in Form A and Form B. Form A of the B-1002 is reserved for USES agencies. Form B is available for outside use. Therefore, thesis uses form B of the B-1002.
Reliability: Reliability studies on the GATE have concentrated on two types of reliability measures - stability and equivalence. The GATE Manual, Section III, Development (U.S. Department of Labour, 1970a) reports reliability coefficients obtained for GATE aptitude scores on various types of populations - males, females, local employment service office applicants and high school and college students. The median coefficient of equivalence for the aptitudes measured by paper-and-pencil tests of Forms A and B of the GATE: B-1002, ranged from .72 to .88 with a median coefficient of .84. The median coefficient of stability for aptitudes measured by paper-and-pencil tests of Form B of GATE B-1002 ranged from .81 to .91 for various samples.

Validity: Validity coefficients on the specific norms for occupations are reported in the GATE Manual, Section III (U.S. Department of Labour, 1970a) and in the validity information exchange section of the Personnel Psychology Journal (U.S. Employment Service, 1954-1959). Validity coefficients for the norms for specific occupations are obtained by computing the tetrachoric correlation between the test norms and the criterion. These coefficients are either predictive or concurrent validity coefficients. The median validity coefficient for the specific norms established is .65.

Norms: Raw scores of the tests are converted to aptitude scores. These are standard scores where the mean of the general working population is
100 with a standard deviation of 20. The general working population sample consisted of 4000 workers who were selected to be typical of the age, sex, educational, occupational, and geographic distribution of the general working population of U.S.

GATB norms are available for specific occupations and for families of occupations. GATB norms for specific occupation are established in terms of minimum qualifying scores for each of the significant aptitude. No total weighted score is obtained; a qualifying test score is achieved only by attaining at least the minimum score on each of the significant aptitudes.

After the norms have been established for a specific occupation, further analyses are made to determine whether the occupation can be grouped with other occupations requiring similar abilities and thus allocated to an occupational family. The Occupational Aptitude Pattern (OAP) norms for families of occupations consist of cutting scores for three significant aptitudes required by the occupations in the family.

Pattern 3, for example consists of G-intelligence, N-numerical aptitude, and S-Spatial Aptitude, with minimum scores of 125 on G and 115 each on N and S. Occupations covered by this pattern are those in laboratory Service and Engineering and related work. Sixty two occupational aptitude patterns covering more than 1000 occupations have been established till now.
Description of Tests in the GATB: B-1002

The tests in B-1002 are described below. The aptitude or aptitudes measured by each test follow each definition. The description has been taken verbatim from the GATE Manual, Section III. Development (U.S. Department of Labour, 1970a).

Part 1 - Name Comparison

This test consists of two columns of names. The examinee inspects each pair of names, one in each column, and indicates whether the names are the same or different. Measures Clerical Perception.

Part 2 - Computation

This test consists of a number of arithmetic exercises requiring the addition, subtraction, multiplication, or division of whole numbers. Measures Numerical Aptitude.

Part 3 - Three Dimensional Space

This test consists of a series of exercises containing a stimulus figure and four drawings of three-dimensional objects. The stimulus figure is pictured as a flat-piece of metal which is to be either bent, or rolled, or both. Lines indicate where the stimulus figure is to be bent. The examinee indicates which one of the four drawings of three-dimensional objects can be made from the stimulus figure. Measures Intelligence and Spatial Aptitude.
Part A - Vocabulary

This test consists of sets of four words. The examinee indicates which two words have either the same or opposite meanings. Measures Intelligence and Verbal Aptitude.

Part 5 - Tool Matching

This test consists of a series of exercises containing a stimulus drawing and four black-and-white drawings of simple shop tools. The examinee indicates which of the four black-and-white drawings is the same as the stimulus drawing. Variations exist only in the distribution of black and white in each drawing. Measures Form Perception.

Part 6 - Arithmetic Reasoning

This test consists of a number of arithmetic problems expressed verbally. Measures Intelligence and Numerical Aptitude.

Part 7 - Form Matching

This test consists of two groups of variously shaped line drawings. The examinee indicates which figure in the second group is exactly the same size and shape as each figure in the first or stimulus group. Measures Form Perception.
Part 8 - Mark Making

This test consists of a series of squares in which the examinee is to make three pencil marks, working as rapidly as possible. The marks to be made are short lines, two vertical and the third a horizontal line beneath them. Measures Motor Coordination.

Part 9 - Place

The equipment used for this test and for Part 10 consists of a rectangular pegboard divided into two sections, each section containing 48 holes. The upper section contains 48 cylindrical pegs. The examinee removes the pegs from the holes in the upper part of the board and inserts them in the corresponding holes in the lower part of the board, moving two pegs simultaneously, one in each hand. This performance is done three times, with the examinee working rapidly to move as many of the pegs as possible during the time allowed for each of three trials. Measures Manual Dexterity.

Part 10 - Turn

The equipment described under Part 9 is also used for this test. For Part 10 the lower section of the board contains the 48 cylindrical pegs. The examinee removes a wooden peg from a hole, turns the peg over so that the opposite end is up, and returns the peg to the hole from which it was taken, using only his preferred hand. The examinee
works rapidly to turn and replace as many of the 48 cylindrical pegs as possible during the time allowed. Three trials are given for this performance. Measures Manual Dexterity.

Page 11 - Assemble

The equipment used for this test and for Part 12 consists of a small rectangular board (Finger Dexterity Board) containing 50 holes and a supply of small metal rivets and washers. The examinee takes a small metal rivet from a hole in the upper part of the board with his preferred hand and at the same time removes a small metal washer from a vertical rod with the other hand; examinee puts the washer on the rivet and inserts the assembled piece into the corresponding hole in the lower part of the board using only his preferred hand. The examinee works rapidly to move and replace as many rivets and washers as possible during the time allowed. Measures Finger Dexterity.

Part 12 - Disassemble

The equipment used for this test is the same as that described for Part 11. The examinee removes the small metal rivet of the assembly from the whole in the lower part of the board, slides the washer to the bottom of the board, puts the washer on the rod with one hand and the rivet into the corresponding hole in the upper part of the board with the other (preferred) hand. The examinee works rapidly to move and replace as many rivets and washers as possible during the time allowed. Measures Finger Dexterity.
Definitions of Aptitudes Measured in GATB

The nine aptitudes measured by B-1002 are defined below. A letter precedes each aptitude for identification. The test(s) of the GATB measuring each aptitude follow each definition.

Aptitude G - Intelligence

General learning ability. The ability to "catch on" or understand instructions and underlying principles; the ability to reason and make judgements. Closely related to doing well in school. Measured by Parts 3, 4 and 6.

Aptitude V - Verbal Aptitude

The ability to understand meaning of words and to use them effectively. The ability to comprehend language, to understand relationships between words and to understand meanings of whole sentences and paragraphs. Measured by Part 4.

Aptitude N - Numerical Aptitude

Ability to perform arithmetic operations quickly and accurately. Measured by Parts 2 and 6.

Aptitude S - Spatial Aptitude

Ability to think visually of geometric forms and to comprehend the two-dimensional representation of three-dimensional objects. The ability
to recognize the relationships resulting from the movement of objects in space. Measured by Part 3.

**Aptitude P - Form Perception**

Ability to perceive pertinent detail in objects or in pictorial or graphic material. Ability to make visual comparisons and discriminations and see slight differences in shapes and shadings of figures and widths and lengths of lines. Measured by Parts 5 and 7.

**Aptitude Q - Clerical Perception**

Ability to perceive pertinent detail in verbal or tabular material. Ability to observe differences in copy, to proof read words and numbers, and to avoid perceptual errors in arithmetic computation. A measure of speed of perception which is required in many industrial jobs even when the job does not have verbal or numerical content. Measured by Part 1.

**Aptitude K - Motor Coordination**

Ability to coordinate eyes and hands or fingers rapidly and accurately in making precise movements with speed. Ability to make a movement response accurately and swiftly. Measured by Part 8.

**Aptitude F - Finger Dexterity**

Ability to move the fingers, and manipulate small objects with the fingers, rapidly or accurately. Measured by Parts 11 and 12.
Aptitude M - Manual Dexterity

Ability to move the hands easily and skillfully. Ability to work with the hands in placing and turning motions. Measured by Parts 9 and 10.

Brief Review of Researches on GATB

The GATB was originally developed to determine the occupational poten­
tialities of persons in or about to enter the labour market. However, soon
the need was felt, as pointed out by Super (1953), of using GATB with
occupational significance in counselling students at the time they enter
high school or college. Thus the researches on GATB have proceeded on two
lines: 1) in developing norms for the selection and placement of employees,
and 2) for vocational guidance and counselling of students. The third
area of research on GATB include the effect of different variables, such
as practice, training, sex, minority group status, cultural exposure, and
the ageing on GATB aptitude scores. Since GATB is one of the heavily
researched tests, studies have proliferated in these areas.

Research on GATB norm development for selection and placement has mostly
conducted by USES which has developed specific GATB norms for more than
1000 occupations. These studies and specific norms are reported in the
following sections of the GATB manuals: Section II - Norms: Occupational
Aptitude Pattern Structure (U.S. Department of Labour, 1970b), Section III
- Development (U.S. Department of Labour, 1970a), Section IV - Norms -
Specific Occupations (U.S. Department of Labour, 1970 c).
These studies are also reported in the Validity Information Exchange Section of the Personnel Psychology (U.S. Employment Service, 1954-1959), and in Droege (1965). Apart from the USES norm development studies, some other investigators have developed selection norms for few occupations, such as mechanical (Potter, 1953), carpentry (Narone, 1953), textile (McCracken, 1957), pressmen (Timmons, 1956), etc.

Some studies on the relationship between the GATB and academic success in various courses of study have also been conducted. Successful academic career is usually a pre-requisite to entering in such professional fields as medicine, engineering, or education. Therefore, when counselling process involves preparing individuals for any profession, the counselee's potentialities for successfully completing the required academic training should be determined. GATB norms which are helpful in counselling process have been established for several professional fields such as engineering (Ennis, 1952), architecture (Dolke et al., 1975a, 1975b; Thompson, 1950), law (Morris, 1955), forestry (Morgan, 1951), pharmacy (Hulbert, 1948), journalism (Dooley, 1951), biological and physical sciences (Thurman, 1950), education (Brown, 1949), psychology (Bierbaum, 1951), etc. For details, see Section III of the GATB Manual (U.S. Department of Labour, 1970a).

In the third area of research on GATB mentioned above, it has been shown that aptitude mean scores increase due to practice effect (Droege, 1966; Showler and Droege, 1969). Training—academic or vocational—does not have any appreciable effect on the GATB aptitudes (U.S. Department of...
Sex differences are observed on GATB aptitudes. Boys score more on Aptitude S, but girls score more on Aptitude P, Q, K, and F (Droge, 1967a). All aptitudes, except Verbal Aptitude (V) show some decline in average scores with age, however, the decline is not high for intelligence (G), and Numerical Aptitude (N). The highest decline were obtained for Form Perception (P), Finger Dexterity (F) and Manual Dexterity (M) (Droge et al. 1963; Droge, 1967b; Stein, 1962; Hirt, 1964; and Weiner, 1964).

Indian Researches on GATB

In India, contrary to popular belief, studies on test construction/standardization for selecting employees are much less in comparison to studies in other fields of psychology, or education. Most of the published work on tests and measurement have been brilliantly reviewed by Mitra (1961 and 1968), Mitra and Kumar, (1974), Menzel (1956), Harper (1960), and Krishnan (1961). Within this area, work on aptitude testing is much less as compared to work on achievement tests, general intelligence tests, and personality tests (Mitra and Kumar, 1974). Studies on multiple aptitude batteries are very very few.

Foreign Users of the GATB (U.S. Department of Labour, 1969a) indicates 42 Indian Users of GATB. When this investigator contacted most of these users in 1970, he found that these users have collected the data but have not published the results.
This investigator has conducted a study on the GATB as a predictor of academic success in courses on architecture (Dolke and Sharma, 1975a). Thaker (1968) compared aptitude profiles of first year students of arts, commerce, engineering and pharmacy. Singh (1965) in a study on GATB prepared norms and aptitude structures for selection of post-graduate students of medicine, physical sciences, education, social sciences, commerce, law, and languages.

Present Status of GATB

GATB is one of the most intensively developed and carefully assessed instrument for selection and placement in industries. It has been accorded favourable reviews by leading measurement text books as well as in Eures' Mental Measurement Year Books, and for which there is more published validity research data than for any other competitive test battery. By the end of 1970, there were 528 GATB users in 87 countries. According to Super (1956), GATB is "Potentially the most useful instrument of individual (vocational) diagnosis which has been developed" (p. 152). At another place Super and Crites also write: "This battery should prove a landmark in the history of the appraisal of vocational promise" (1962, p. 330). According to Cronbach, "the GATB is designed with an efficiency that has never been exceeded" (Cronbach, 1960, p. 274).