Chapter II

APTITUDE, PROFICIENCY AND ABILITY : NATURE AND MEASUREMENT

(a) Nature and Definition of Aptitude

To proceed in a field of activity presupposes an aptitude for it. An aptitude implies the capacity to become proficient in a particular branch of work and to be interested in it, to find in it happiness and satisfaction. If educational or vocational line is wrongly chosen, it results in personal and social wastage. So a clear understanding of the nature of aptitudes and abilities, and of the means for measuring them is very important. This chapter deals with these problems.

The need for special aptitude tests to supplement so-called intelligence tests is now generally recognized. A poll of experts conducted in 1944 indicated that 55 out of 79 psychologists believed in the

usefulness of measuring separate aptitude factors. A critical evaluation of the intelligence tests indicates that an individual's performance on different parts of such a test often shows marked variation. A person might score relatively high on a numerical subtest and low on a verbal subtest, or vice versa. Aptitude tests try to measure an individual's standing in different traits that are required to predict future success. This is a technique for intra-individual analysis.

Warren's Dictionary of Psychology (1934) defines aptitude as a condition or a set of characteristics indicative of ability to learn. This implies that an aptitude is not necessarily an entity, but rather a constellation of entities, a set of characteristics which enables a person to learn the same thing.

English and English (1958) define aptitude as capacity to acquire proficiency.

A scientific definition of aptitude should provide for specificity, unitary composition and the facilitation of learning of some type of activity. But in practice the requirement of unitary nature is frequently disregarded without ill effects. In our present state of knowledge and with current techniques, it seems wiser to be satisfied if the aptitudes

measured are relatively distinct and have some validity, rather than to devote much time in obtaining pure traits.

Super (1969), summarizing the above argument, says,

> 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 the aptitudes measured.

A fourth and final characteristic of an aptitude that should probably be added to the above list is its relative constancy. If behaviour or success is to be predicted, the entity upon which the prediction is based should be relatively stable. Aptitude which varies irrationally over a period of time, an aptitude which is itself unreliable could be neither reliably measured nor significantly correlated with anything else. This would give rise to a debate whether an aptitude is innate or acquired; but, according to Super (1969), whether largely innate or largely acquired, the aptitudes about which we know something appear to become crystalized by the end of childhood and after that they mature in a predictable way and are generally relatively constant.

Bingham (1937) makes clear the three terms - (1) Condition or set of characteristics, (2) Aptitude, (3) 'With training' -,generally used in defining aptitude,as follows :

> Nothing is said in the definitions of aptitude as to whether the set of characteristics is acquired or inborn. Too often it has been implied that the term aptitude has reference to a person's native endowments only. Tests of aptitude, according to this mistaken view, should undertake to disclose natural bent, the strength of different dispositions, tendencies and capacities inherent in the individual's original constitution, without regard to the modification in these capacities which have occured in the course of experience. But this can not be done. At least it is not possible with means at our disposal today. We want the facts about a person's aptitudes as they are at present, characteristics now indicative of his future potentialities. Whether he was born that way or acquired certain enduring dispositions in his earliest infancy, or matured under circumstances which have

> radically altered his original capacities is a question of little practical moment to the individual himself at a time when he has already reached the stage of educational and occupational planning. His potentialities at that period of his development are quite certainly the product of interaction between conditions both innate and environmental. So when appraising his aptitude for a particular field, we must take him as he is, not as he might have been.

Aptitude, moreover, connotes more than potential ability in performance; it implies fitness, suitability for the activities in question. When appraising aptitudes, we are on the alert for symptoms of 'ability to acquire' or 'a genuine absorption in the work', as well as a satisfactory level of competence. Ability to acquire 'with training' need not necessarily mean formal or overt training; it might even be undirected experience.

In the light of the abovementioned interpretations, Bingham (1937) defines aptitude as

> a condition symptomatic of a person's relative fitness of which one essential aspect is his readiness to acquire proficiency - his

potential ability - and other is his readiness to develop an interest in exercising that ability.

Hahn and Macleans (1955) have defined aptitude as follows :

> Aptitudes are correctly referred to as latent, potential, undeveloped capacities to acquire abilities and skills and to demonstrate achievements.

But cautioning against overstressing the aspect of innateness of an aptitude, Wesman (1948) says,

> The expression 'born that way' is a dangerous fallacy. For our present purpose, we really do not need to determine 'how much' of an aptitude is hereditary and 'how much' reflects environmental forces. Aptitude is the result of the interaction of heredity and environment.

The term aptitude is extremely broad. Its use as being limited to the specialized learning capacity is misleading. It is not special intelligence. It is not specific scholastic aptitude test either. Besides other things, it embrances achievement also. An achievement test can serve as an evidence for what a person has

learned so that either prediction can be made of how well he will learn additional material of similar nature, or indication can be made whether he has the skills or knowledge required for further success in a particular field. As Wesman (1948) says,

> The use of an achievement score solely for recording a person's accomplishment is relatively sterile; only when it predicts, obviously or indirectly, is such measurement useful.

(b) Measurement of Aptitudes

Aptitude measurement mainly depends upon differential psychology. The advent of the method of calculating correlation coefficients at a critical moment gave a big thrust to the development of testing special abilities. With the help of Pearson's Product-moment Correlation formula, it is possible to determine the extent of correlation within a set of data.

As gathered from the various definitions given in the previous section, an aptitude test is a test which is used for prediction of some type of learning. The aptitude test is a measure of the abilities and characteristics of a person and helps to ascertain what he can do at that instant and also in future and how

well he can do that. Responses which are made under specified conditions are indicative of the level of his performance in a particular field at the present moment and his fitness for future persuance of it. In this way data are compiled about what person actually does under the circumstances imposed by the test. His present behaviour is measured. From these data the possibilities of his future accomplishments can be inferred.

A comparatively recent development in the field of measuring aptitudes is the aptitude battery, or what is sometimes called the 'differential' or 'factorial' aptitude battery. These batteries are based on factorial analysis; they are a complex or a set of a manageable number of subtests which will, in various combinations, be optimally predicative of success in many different spheres.

Discussing the functions of an aptitude battery, Bingham (1937) says,

> Aptitude batteries ascertain what an individual actually does in certain standardised situations; and from these measurements the estimate of capacity for future accomplishment is an inference. Such an inference is, of course, a statistical probability, not a certainty.

Three other terms should be differentiated. According to Bingham (1937), skill is almost synonymous with proficiency. Proficiency is the degree of mastery already acquired in an activity. Ability denotes either aptitude or proficiency or both. Both Bingham (1937) and Super (1968) support this view.

(c) Nature of Ability

With regard to the nature of abilities and their measurement, Vernon (1956) says,

> An ability implies the existence of a group or category of performances which correlate highly with one another, and which are relatively distinct from (that is, give low correlations with) other performances. Some people are better than others at tasks involving manipulation of mechanisms, and this ability is fairly consistent or general in the sense that those who are good at one such task are also usually good at other tasks of similar, related type. But this consistency is not perfect. So this means that there is a general group of specific abilities. A common element, such as proficiency in mechanical things, or verbal things, is often referred to as a group

> factor, since it occurs in a group of performances of a certain restricted type. It differs from a general factor like intelligence, which is found to run through an extremely wide range of tests.

Since consistency or overlapping of different verbal tests is not perfect, no one test can give a really adequate measurement of verbal ability. But by combining several tests we are likely to get a result much more representative of the group factor as a whole.

Spearman believes that each test is made up of two components. In so far as it correlates with other tests, it is measuring some common factor or factors. This is often referred to as the test's communality. But in so far as it fails to correlate (highly), it is measuring a purely specific component, or something which is peculiar to that test alone and has no relationship to any other test. This is called the test's specificity. It, of course, includes the error variance.

It may safely be concluded that there is no test that measures NOTHING ELSE but a G factor and a specific factor, since the type of test material employed always introduces some additional common element. All verbal intelligence tests, together with other tests

depending on manipulation of words, involve a verbal and educational factor, which has been named V or V.ed.

(d) Ability and Aptitude

As stated above, ability is closely related to aptitude. Ability, in its broadest sense, means power to perform designated responsive acts, without implication as to whether this power is potential or actual, native or acquired. A person with language ability can, - is able to, has it in him to - deal with language well, either at the present time or after he has had the requisite training and experience. If such a person is now readily dealing with language well, his ability may be called language proficiency. 'Proficiency' refers to the degree of ability already acquired, in contrast to 'capacity', which is potential ability.

Thus ability includes both proficiency as well as capacity, achievement as well as aptitude.

The present battery of tests is an ability test; in a sense it is a proficiency test; but it can serve as a good indication for future success in linguistic tasks (for example, for studying subjects where language enters as a component of success). Hence the investigator has thought it fit to name it 'a language ability test' rather than 'a language aptitude test' or 'a language proficiency test'.

(e) Assumptions

Assumptions underlying the concept of ability are :

(1) Existence of difference among traits within an individual - Intraindividual differences.

(2) Existence of difference among individuals - Interindividual differences.

(3) Normality of trait-distribution.

(4) Stability of traits.

(1) Intraindividual Differences

There is a tendency for different abilities of a single individual to cluster about his own average. An individual's strongest trait may be relatively stronger than his weakest trait.

Individuals seldom score uniformly high or uniformly low scores in all traits. Instead, there is a variation in their scores in different spheres of aptitudes, achievements, interests and traits.

As Bingham (1937) says,

> It is an undisputed fact that there is a wide disparity among various talents of an individual. They are termed trait differences or intraindividual differences. To think that

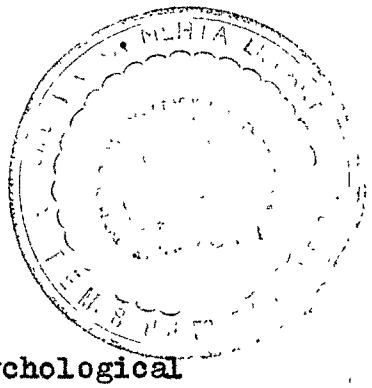
they are relatively unimportant would be a mistake. Actually, intraindividual differences are far more important for a man than interindividual differences.

To what extent do an individual's best and worst capacities differ from his own average? Hull (1928) has said that the best person in a group is 3 to 4 times as efficient as the poorest. If the variability within the individual is 80 % as great as that, then the average individual's best potentiality must be 2½ to 3 times as good as his worst. But such quantitative estimates are only tentative.

The distribution within an individual follows the normal curve. The realization of an individual's different abilities enhances the chances of a person for educational and occupational adaptation.

(2) Interindividual Differences

There are marked differences among individuals with regard to a particular trait. These differences are relatively large. The distribution of any trait among individuals is normal and relatively constant. Individuals differ in the amount of the trait they possess. This leads us to the next two assumptions.



(3) Normality of Trait Distribution

As is well-known, most of the psychological traits are distributed among individuals in a normal way, that is, their distribution follows the normal probability curve. Most of the scores of such a distribution cluster around the central position, and their frequency becomes more and more sparse, as we approach the extreme scores. The central tendency can be measured by statistics such as the mean or the median. The deviation of particular scores from the central tendency can also be measured. The relative position of a particular score in comparison with others can be measured through devices such as percentile ranks.

(4) Stability of Traits

The composition of traits within an individual is relatively stable and constant. If it were not so, no measurement of psychological traits could be reliable. Nothing can be said, with a degree of reliability, about a trait that is constantly changing. Born with a measure of different traits, a person continues to possess these traits in about the same proportion over a period of time.

(f) Usefulness of Special Abilities Tests and Aptitude Tests in Education

Research shows that aptitudes crystalise early in life; it is possible either to estimate them by an individual's participation in various activities or to measure them scientifically by differential aptitude tests or special abilities tests developed by research. A timely knowledge about a student's level of performance in a special field or a timely advice to him for a proper selection of courses based on a careful assessment of abilities and aptitudes can prevent the loss of human energy and productivity and a lot of frustration.

In educational programme or in planning curriculum, in school management or in educational research, mental measurement is an essential first step. At various stages of vocation, it ensures economy and efficiency. In life, it prevents maladjustment. The school or the college is concerned with special abilities measurement in four ways.

(1) Identifying Special Abilities and Aptitudes

The school or the college should be responsible for identifying the general and special abilities of each pupil. Students in public schools and colleges

come from different types of homes, communities and socio-economic classes. In these various homes and communities and socio-economic classes, different norms, ideals and abilities are encouraged or discouraged. Consequently, different students develop different abilities, and those also in different degrees. Out of these various personal and material influences interacting with a student, a wide variety of talents and abilities arise. Of course, these special abilities and aptitudes are partly a product of nature; but partly they are a product of accidental or deliberate influence of the environment. Whatever the circumstances, the child possesses at various stages in his development a number of special abilities and aptitudes at various levels. The school and the college need to identify these abilities in order to provide the child with the education best suited to his needs and to social welfare.

At the same time, it is useful to identify and measure them at proper time. Ability for language or mathematics or science could very profitably be measured when a student enters school, or when he leaves school to enter college, or when he enters college. An identification of abilities and aptitudes is a necessary prerequisite to education.

(2) Developing Talents

The school and the college have the responsibility for encouraging the development of a pupil's talents. Once the talents are identified, a series of curricular experiences should be provided to each student so that he may develop to his optimal levels of attainment.

(3) Educational Guidance

Teachers and guidance specialists in schools and colleges have continuous obligation to guide students in their educational progress. Such guidance may involve selecting students properly for different courses, and even after the selection of a course, for locating proper students for different individual and group experiences, grouping students for special work or assigning them to special classes such as one for the talented or one for the slow learners.

(4) Vocational Guidance

An increasing use of differential aptitude tests and special abilities tests at the school and college level is being made in order to provide vocational guidance. Youth who are ready to leave school or college are given various tests to help them identify their aptitudes and abilities. On the basis of these

test scores and other relevant data, students are advised to choose different vocational avenues. For students entering college, various college entrance aptitude tests are given to advise them on the type of college curriculum best suited to them.

(g) Implications of The Above Discussion for The Present Work

The following implications can be deducted from the above discussion :

(1) Relationship between a special ability and an aptitude is close and a measure of special ability can have considerable predictive value for future performance. So definitions of special abilities apply in a great measure to aptitudes and vice versa. A special ability test measures present level of attainment in a particular, special sphere and, at the same time, is an indication of a possibility of future success in that sphere.

(2) Special abilities and aptitudes are the products of both nature and nurture. So when a special ability test measures a trait, it does not claim that the trait is totally inborn or that the scores are a measure of

some inborn, innate ability uninfluenced by later experiences. Aptitudes are the result of interaction of heredity and environment.

(3) A factorial battery is usually expected to insist on the 'specificity' or 'unitary' composition of the trait measured. But in practice, the requirement of unitary nature is not much emphasized. As Super (1969) pragmatically states,

> In our present state of knowledge and with the current refinement of our techniques, it seems wiser to be satisfied if the aptitudes measured are relatively distinct and have some validity, than to devote too much time to obtaining pure traits. It is evident that the best available tests do not overstress the unitary nature and purity of the traits to be measured.

(4) Normality of distribution of a trait in a given population forms the basis of ability measurement in the present work. Moreover, the measuring instrument designed by the present investigator is intended to give

measures which are fairly stable over a period of time.

Having considered the nature and measurement of aptitudes and abilities in general in this chapter, it will be worthwhile to discuss at length the nature of language ability. The next chapter deals with that.

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