CHAPTER II
A number of abilities are required to perform any kind of activity. Measurement of any single ability cannot effectively predict how fit a person would be on his job. There are some jobs which might require more of intellectual abilities than specific abilities or muscular coordinations and vice versa for other jobs. Fitts and Posner (1969) opined that there is hardly any purely sensory task which will also not require some amount of perceptual abilities, attention, intelligence etc. For example, a clerical job may involve: ability to establish relationship between numerical figures and words; have a good speed and accuracy; handling different files quickly; proof reading; maintaining good relationship with peers; etc. A weaver's job on the contrary may involve: ability to change shuttles; a demand on endurance, strength and good eye-sight; ability to tie broken yarns; ability to get along with fellow weavers; etc. Thus it indicates that any job requires a pattern of abilities rather than a single ability. It is possible, however, to place emphasis on one or another component functions. It may also be possible that two jobs may require the same combination of abilities but in different proportions.

Since World War I, psychological tests have been in use and standardization of these tests is an on-going
occupation for test constructors. Industries abroad have been quite conversant with the various types of psychological tests which are being administered for personnel selection and various other purposes. A survey of 200 companies in the United States of America revealed that 65% were using formal testing programme and considered the programme worthwhile (Personnel Men View Testing Programme, 1959).

In an attempt to find out whether the use of psychological tests for personnel selection had any beneficial effect over those recruited traditionally, Musgrave (1942) conducted an experiment in which a group of employees was recruited without any formal testing programme, while another group was hired on the basis of maximum scores on intelligence tests. He showed that the advantages gained in hiring persons having maximum scores on the test over the old method were: outstanding employees 32% against that of 22%; satisfactory employees of 62% against that of 40%; unsatisfactory employees of 6% against that of 30%. This shows that by using an intelligence test the percentage of outstanding employees was increased by 10% and the percentage of unsatisfactory employees was decreased by 24%. In understanding the status of intelligence tests in industries, Kornhauser in 1945 sought opinions from a group of psychologists to this effect. He found that a majority of psychologists
believed that these tests met the practical need of classifying people in a better way than doing it without using the tests. But he admitted that the people having little schooling obtained low scores compared to that of the better educated people. Stromanberg (1948) also showed that after a testing programme had been installed, young applicants showed a substantial improvement over older employees. In the technique of his experiment he administered psychological tests in three plants under one management. It was seen that in one plant although the test selected group had less favourable scores at the time of their being hired, three months later their scores were found to be superior to those of the older employees (selected without undergoing psychological testing programme). In the other two plants the test selected groups were also found to be superior to the criterion group (older employees). In another experiment, Wilkinson (1953) showed substantial correlation between job level and performance on an arithmetic test for 173 clerical workers with a validity coefficient of 0.49.

Brown and Ghiselli (1953) in their study on taxi drivers reflected the view that turnover was very high for men scoring very high and very low on intelligence test, and considerably less for those whose scores were
in the middle (i.e., neither too high nor too low). This indicates that superior intelligence is disadvantageous in hiring taxi drivers, but scores falling in the middle range may be more effective for optimum job performance. Harrell (1967) pointed out that much of the clerical work requires perceptual factor that is measured by names and numbers. This factor is more important than reasoning ability for routine clerical jobs. He further noted that clerical tests include such measures as reading, comprehension, cancellation, substitution and coding spelling and grammar, alphabetizing, arithmetic and verbal facility. Interestingly, he argued that though finger, hand and arm movements are common in the clerical occupations, tests of dexterity have shown low validity; the required levels of dexterity are no doubt possessed by nearly all normal persons.

Kipnis and Glickman (1962) opined that the degree of relationship between a test score and performance represents one measure of the value of a test in predicting job success. Taylor and Russel (1939) formulated an important table for "actuarial prediction", using proportion of applicants considered to be satisfactory, correlation between the test score and criterion, and selection ratio. This table shows the extent to which improvement in selection varies with the size of the correlation coefficient. But Smith (1948) was critical
of this view advocating that the table values do not apply to triangular distribution of test scores plotted against a criterion. He argued that the Taylor-Russel table contains two assumptions: (i) every increase in average test score is associated with an increase in average criterion measure; (ii) criterion measure in relation to test score is a linear function. But, neither of the assumptions are fulfilled under conditions when success on job increases with test scores up to a certain point but above that point further increases in test scores either bear no relation or a negative relation to job success. For example, in Wilkinson's study (1953), it was noted that taxi drivers having very high or very low scores on intelligence test had high turnover rate.

There are some indications that different ethnic groups manifest differences in performance on some tests, but it does not necessarily imply that the use of such tests would result in unfair discrimination. The critical issue concerns to the validity of the tests for the groups (McCormick and Tiffin, 1974). Krug (1966) argued that treating people equally for providing equal opportunity for employment does not necessarily mean treating them identically. The noted psychologist Guion (1966) tested the fairness of the psychological tests and pointed out that discrimination per se is not unfair if the people who are less likely to do well on a job
are less likely to be hired. He further stated that discrimination is unfair only when persons with equal probability of job success have unequal probabilities of being hired for the job. Kirkpatrick et al (1958) put forward that a test may be considered to be unfairly discriminatory against members of a minority group if the minority group applicants obtain significantly lower test scores than non-minority applicants and the minority applicants could be as successful on the job as the non-minority applicants.

Validity of individual aptitude tests has been determined separately for different ethnic groups. In one of his studies, Tylor (1965) found a fairly substantial difference between blacks and whites in performance on mental tests. Comparative test performance, especially with cognitive tests, has further been presented in conjunction with several personnel test validity studies (Ruda & Albright, 1968; Moore Jr. et al, 1969). In another study, Grant and Gray (1970) found that the same combination of test scores was about equally predictive of performance of blacks and whites in training programmes for telephonic installations and repair occupations. Boehm (1972), however, made a distinction between differential validity and single group validity. One such study was done by Gael and Grant (1972) who studied telephonic service
representatives (107 black males and 193 white males). They showed that a battery of tests predicted the job performance of employees of both groups with relatively the same degree of accuracies. The differences in performance on mental tests between blacks and whites, however, ran into arguments regarding the basis for such differences - whether genetic, nutritional, cultural, educational or otherwise (McCormick and Tiffin, 1974). Enneiss (1970) and Krug (1966) argued that if separate validation studies do reflect differences in test scores/criterion values, and if these differences could result in unfair discrimination, separate selection standards should be established.

In India, studies on aptitudes and abilities are very few, and most of them were carried out at the school level (Mukhopadhyay, 1966; Basu, 1967; Trivedi, 1970; Basu Mallik, 1971; Goverdhan & Ravichandran, 1972; Chatterjee & Mukherjee, 1972; Kaur, 1973) and the University level. Mohan (1972) working on 310 University students (165 females and 145 males) on Raven's Standard Progressive Matrices and a General Mental Ability test, observed high correlation between the two instruments (0.654) for the whole group and for the males (0.657) and the females (0.652). The correlations were significant at p = 0.001 level of significance. In another study, Manerikar and Patil (1972) administered the
Wanderlic Personnel test (1-b) and the Social Judgement scale (II) at the time of selection and O+’s test subsequently, in the class on 51 students, and computed the coefficient of correlations between these tests and performance in the examination. They concluded that intelligence test scores were dependable predictors of performance in the course. Test 1-b was superior to the other tests. Patel (1972) prepared two forms of aptitude tests, each having three parts. Part-A was designed to evaluate comprehension and reasoning, Part-B evaluated knowledge and Part-C dealt with the process of science. He used Devi’s discrimination index for item analysis, computed reliability of the test by using Kuder Richardson formula and established validity by computing intercorrelation of each part with every other. He found that the mean difficulty value of different sciences ranged between 0.30 and 0.40; reliability of the whole form between 0.9 and 0.99; reliability coefficients for different sciences between 0.90 to 0.98; and intercorrelations between total scores on the test and the scores on the school leaving examination between 0.12 and 0.14.

The administration of aptitude test at occupational levels has not yet drawn much attention. A few studies that have been carried out so far are as follows:
Joseph and Basu (1971), in their study entitled "Test-selected and Non-test-selected Craftsmen Trainees with respect to their Training Performance", showed that while 74% of the test-selected trainees were superior in their training performances, only about 39% were superior in a group of non-test-selected trainees. They further showed that the average scores on the test of the test-selected trainees were greater than that of the non-test-selected group. The authors also found out a significant positive relationship between the trainees' test performance at the time of selection with their training performance in the subsequent years.

Gupta (1972) worked on 20 supervisors and 164 candidates for clerical jobs. The author used a battery of clerical aptitude tests consisting of seven sub-tests. A 7-point rating scale for each sub-test was developed and ratings given by the supervisors were taken as the criterion to test the efficacy of these tests. He obtained critical scores for each sub-test and these scores had high coefficients of tetrachoric correlations: Intelligence 0.70; Numerical Ability 0.68; Language usage 0.68; Filing 0.62; Classification 0.82; Copying 0.69; Checking 0.38.

Deb (1965) conducted a research project during 1950-56 on the construction and standardization of an engineering aptitude test. This was a paper-pencil type
of aptitude test presenting pictorial and diagramatic representation of machine parts and appliances. She computed the split-half reliability and corrected by Spearman-Brown formula, to be 0.80 and 0.89 respectively. Annual examination results of the subjects of engineering curriculum were considered to be the criteria for the computation of validity of the test. The validity coefficient of the test was found to be considerably high (0.81).

Singh (1965) prepared GATB norms and aptitude structures of post-graduate students. The sample for the study was 614 male and 102 female students drawn from the various academic courses, viz., Engineering, Physical Sciences, Pharmacy, Commerce, Social Sciences, Languages, Law and Medical Sciences. The age range of the subjects was 19 years to 30 years. He showed that for some of the tests the minimum was reached within 2.5 standard deviation from the mean. Tests 3 & 4 showed skewed distribution and the norms seemed to be slightly affected by this factor. He, however, provided norms for the aforesaid academic courses.

Dolke and Sarma (1973), working on the development of norms for admission of students in the architectural courses, found statistically significant correlations of the GATB aptitudes with the average number of credits earned by the students per semester, and the average grade. Their
subjects scored high on Verbal Aptitude (V), Spatial Aptitude (S) and Form Perception (P) relative to the other aptitudes with relatively low standard deviation on Numerical Aptitude (N), Motor Coordination (K), Finger Dexterity (F) and Manual Dexterity (M). Dolke (1976) worked on the Indian adaptation and standardization of the GATB on behalf of the Ahmedabad Textile Industries Research Association (ATIRA). A general working population of 1600 employed adults constituted the sample of the study. The sample was drawn from the occupations involved in textile industries, viz., the technicians and the clerks of the spinning, weaving, processing, engineering, statistical quality control, labour, stores, accounts, costing and internal auditing. He had prepared a manual of the GATB for the Indian population, providing norms for the aptitudes. This study appears to be the first of its kind in the country, and hence, earns appreciation. But the study was concentrated in one city of the vast Indian territory and only a few technical occupations were included. Moreover, the study can be assumed to have been conducted on the Gujarati speaking population, where India is a multi-lingual country. From these points of view the study is far from being called an adaptation on the National level.
The above review on psychological testing indicates that many researches have been carried out abroad on the development and standardization of psychological tests in comparison to the studies done in India. One of the reasons may be that the psychological testing services have started since long (World War I) in the developed countries; whereas in India it has started only recently. It does not have, as yet, appreciable applicative values in industries. A great variety of tests are available but hardly any for industrial uses (Tiffin and McCormick, 1974). In India, however, as far as the literature available, the present work of the GATS on industrial population, after Dolke (1976), may be considered to be the second study aimed at the furtherance of knowledge in this area.