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CHAPTER

DESCRIPTION OF THE TOOLS DEVELOPED OR SELECTED AND USED IN THE STUDY

4.1 TOOLS EMPLOYED IN THE STUDY

The present study is concerned with finding out the relationship between the following broad variables and the academic achievement of the students.

(1) Home environment

(2) Socio-economic status

(3) Need for achievement

(4) Intelligence

(5) Personality

To find out the relationship between the above variables and the academic achievement, it is necessary to measure the above variables. For measuring the variables, suitable tools are needed and the following are the tools used in this study for measuring the variables :

(1) Home environment : Questionnaire-cum-rating scale developed by the investigator.

(2) Socio-economic status : Kuppuswamy SES Scale.

(3) Need for achievement : Sentence Completion Test of Mukherjee

(4) Intelligence : Culture Fair Intelligence Test of Cattell

(5) Personality : The Sixteen Personality factor questionnaire of Cattell

The development of the questionnaire-cum-rating scale is detailed in the pages to follow. In the case of socio-economic status, need for achievement, intelligence, and personality, a brief review relating to several tools available for measuring them was made, and finally the tool selected for measuring them is described in detail.

4.2 MEASUREMENT OF HOME ENVIRONMENT - DEVELOPMENT OF QUESTIONNAIRE-CUM-RATING SCALE

Since suitable tool to measure home environment of the college students was not available, the investigator himself developed a questionnaire-cum-rating scale for measuring the home environment.

(a) Areas of Home Environment included in the Questionnaire-cum-Rating Scale

The rating scale measures four areas of the home environment namely,

(1) Parental value on education and academic achievement

(2) Emotional climate

(3) Parental encouragement

(4) Educational facilities available in the home

The above four areas were selected on the basis of their importance as revealed by previous researches (vide Chapter 2).

(b) Selection of Items for each Area

The items in the Area 1 - Parental value on education and academic achievement - measure whether the parents had clearly perceived various uses of education and academic achievement. The items in the Area 2 - Emotional climate - touch different home conditions that make the student worry. The items in the Area 3 - Parental encouragement - include different processes of encouragement (~~with~~ what the parents interested in the education of the children do) and the items in the Area 4 - Educational facilities - cover the educational facilities available in the house.

With the above orientation in view, the investigator has written nearly 50 items for each area. Each item was written on a separate paper and these papers were mixed up. These papers were presented to three Readers in the Department of Education and Psychology, M.S. University, Baroda, and were requested to indicate the area to which each item belongs and also the suitability of the item. The purpose of the study was made known to them personally by the investigator. The items

that were accepted by all the three judges were selected and written separately for each area. Then these items were shown to three Lecturers in English of the Faculty of Arts who have been teaching degree classes with a request to see the suitability of the language, directiveness and clarity of the items used. Their suggestions have been carried out wherever needed. These items were presented to 20 students of B.A. Class and they were requested to underline the words they ~~are~~ were not able to understand. On the basis of this, some words have been simplified. The opinions of the Lecturers in English have been obtained again. The revised items for each area written area-wise were presented to the same judges (Readers) for their final comment and the items accepted by all the judges were finally chosen.

The rating scale finally consists of 100 items, 20 to 30 items being in each area. Fifty items are worded positively and the other fifty items are worded negatively. The number of items in each area, nature of the item (negatively worded or positively worded) and the exact numbers of the items in the rating scale are given below :

Area	Number of items	Negatively worded or positively worded	Exact numbers of the items in the rating scale	Score possible Maximum	Score possible Minimum
1. Parental value on education and achievement	20	All +	1,5,9,.....77	100	20
2. Emotional climate	30	All -	2,6,10,....98 81,85,89,93, and 97	150	30
3. Parental encouragement	25	All +	3,7,11,....99	125	25
4. Educational facilities	25	20 items - 5 items +	4,8,12,...80 (-) 84,88,92,96, and 100 (+)	125	25

(c) Nature of Items of the Rating Scale

As stated earlier, the items in the area of parental value on education and achievement measure whether different uses of education and achievement have been clearly perceived by the parents. The items in the area of emotional climate in the home focus on different worries the students face in the house. The items in the area of parental encouragement touch different ways of encouraging the students in their studies. The items in the area of educational facilities include various facilities in the house. While writing the items the results of previous researches have been kept in view. The specific aspect measured by each item in each area is given below together with the number of the item.

Parental Value on Education
and Academic Achievement

	1	For success in life
	5	Valuable (general statement)
	9	As a means for better achievement in life
	13	For getting lucrative and influential job
	17	For making independent living
	21	For meeting the problems of day-to-day life
	25	To realise duties and responsibilities as a citizen
	29	To build up good character
	33	For developing a real love for knowledge
	37	For improving one's status in society
	41	Contributes to intellectual growth of the individual
	45	To make best possible use of the abilities
*	49	Attaching more value to high rank in examination than to anything else
*	53	Desirability and utility of getting distinction for advancement in life
*	57	Need for class in the examinations for getting an attractive job
*	61	Necessity of high rank for getting admission to further courses
*	65	Necessity of high rank for getting scholarship
	69	To contribute to progress and prosperity of the country
	73	To help to use leisure time to better advantage
	77	For betterment of one's life.

* These items relate to value on academic achievement.

Emotional Climate in the Home

2 Death of parents or other member of the family

6 Absence of parents from residence

10 Low status of parental occupation

14 Poverty of family

18 Ill-health of parents or other member of the family

22 Low educational level of parents

26 Jealousy of sisters and brothers

30 Fault-finding nature of family members

34 Harsh treatment of step-mother, aunt, mother-in-law, sister-in-law, grand-parents, etc.

38 Unhappy relations between parents and other members in the family

42 Uncordial relations between parents and neighbours

46 Parental unhappy relations amongst themselves

50 Actions approved by one parent being disapproved by the other

54 Neglect by parents

58 Refusal of reasonable requests

62 Keeping unconcerned when the child is ill

66 Belittling by parents before others

70 Lack of affection and love of parents

74 Partial treatment of parents - other sisters and brothers getting what they want while he is not

78 Parental domination allowing no independence to do anything

81 Parental strictness without allowing freedom of expression

82 Obeying many bosses in the home

85 Old fashioned ideas of parents

86 Orthodox nature of family observing in detail all religious festivals and ceremonies

89 Objection to invite friends to the house

90 Family looked upon with disgrace by community

93 Disliking the movement with boy/girl friend

94 Disapproving the idea of marrying the boy/girl liked

97 Forcing the child to read

98 Brothers and sisters making fun or quarreling with the child.

Parental Encouragement

3 Encourage to aim at the attainment of high grades

7 Inspire to excel classmates in academic achievement rather than in other activities

11 Encourage to study hard

15 Watch educational progress

19 Know the problems standing in the way of educational progress

23 Know the strengths and weaknesses in different subjects

27 Discuss between themselves as to how to help in educational pursuits

31 Discourage not to mix with those who are not interested in studies

35 Encourage to choose bright students as friends

39 Look into the progress reports issued by the college

43 See the answer papers returned by the Lecturers

47 Meet or write to the Lecturers to know the performance

51 Encourage to read text books more than the other books

55 Appreciate when high grades are got

59 Present gifts when high grades are got

63 Choose to give such presents which are useful and satisfying

67 Emphasise completion of college work sacrificing even immediate pleasurable activities

71 Stress on planning work ahead and following it regularly

75 Ask to devote some time regularly for studies every day

79 Ask to take help from Lecturers or intelligent classmates for getting the doubts cleared

83 Know about the attendance in the college

87 Prepared to sacrifice their needs and desires for the sake of education of children

91 Enquire how well the child is progressing in studies

95 Interested in education of the child

99 Ask to share reading material with classmates.

Educational Facilities at Home

4 Lack of text-books

8 Shortage of clothes

12 Lack of news-papers, magazines, journals, books and radio

16 Lack of suitable and adequate space for studies

20 Lack of furniture for studies

24 Difficulty in paying fees in time

28 Tiresome due to sundry work

32 Prevention from participating in social functions for want of money

36 Assistance to parents in their profession hindering with studies

40 Lack of money for daily expenses

44 Lack of money to pay for medical treatment

48 Inability to pay for tuition

52 Dissatisfaction with quality of food

56 Lack of tiffin or meals

60 Tiresome due to walking long distance

64 Waste of time in covering distance to and from the college

68 Adverse conditions (disturbance by other members, noise, insufficient ventilation and lighting) hindering to concentrate on studies

72 Over-crowding not conducive for studies

76 Sundry work taking study time

80 Lack of suitable and adequate facilities for educational progress

84 Willingness of parents or other members of the family to provide help in studies

88 Educational competence of parents or other members of the family to provide help in studies

92 Extent of help in studies given by parents or other members of the family

96 Usefulness of the guidance and help provided by the parents or other members of the family

100 Usefulness of the tuition provided

(d) Arrangement of the Items in the Rating Scale

Instead of putting all the items measuring a particular area in one place, the items are distributed, to avoid response-set, in such a way that the first item belongs to the first area, the second item belongs to the second area, the third item belongs to the third area, the fourth item belongs to the fourth area and the next four items belong to areas 1 to 4 respectively. Thus, every fourth item belongs to the same area. The arrangement of the items is clearly indicated below :

Area 1 (Parental value on education)	Area 2 (Emotional climate)	Area 3 Parental Encouragement)	Area 4 (Educational facilities)
1	2	3	4
5	6	7	8
9	10	11	12
..	..	..	..
..	..	..	..
..	..	..	..
..	..	..	..
..	..	..	..
81 @	..	..	84 *
85 @	..	..	88 *
89 @	..	..	92 *
93 @	..	..	96 *
97 @	98	99	100 *

@ Items belong to area 2

* Items positively worded

(e) Validity

Judges' Opinion : As stated earlier, the items that were agreed to by all the three judges only were retained.

Validation against External Criteria : The test is validated against two external crideria-ratings of the Lecturers and parents. The Lecturers who had good contact

with the home environment of the students were requested to rate separately the four aspects of the home environment of the students using a five-point scale. The five points used for rating are - (1) Very high, (2) High, (3) Average, (4) Low, and (5) Very low. The scores given to these five points are 5, 4, 3, 2 and 1 respectively. Similarly, the ratings of the parents were also obtained. Parents rated only one student (their child) and Lecturers rated one or two students whose home background was known to them very well. Forty-six Lecturers helped in rating the students numbering seventy-four. The investigator met the Lecturers and the parents and explained to them in person the need and importance of the study and the way in which each aspect of the home has to be rated.

The correlations of the ratings with actual scores on the test are as follows :

Area	Lecturers' Rating N = 74	Parents' Rating N = 41
1. Parental value on education and achievement	.64	.71
2. Emotional climate	.51	.55
3. Parental encouragement	.62	.75
4. Educational facilities	.72	.61

Internal Validity : Internal validity of the items is estimated by the item-total correlation method. That is, correlating the score of an item of a particular area with

the total score of the items of that particular area. The item area total correlations ranged from .38 to .74.

(f) Reliability

Reliability is established by two methods - test-retest and split-half methods.

Test-retest Reliability : The same students of B.A. and B.Sc. classes were re-tested with testing interval being 3 weeks and 8 weeks. There were some absentees at the time of re-testing and test-retest correlations ~~are~~ were calculated taking the students who were present for all the three test administrations. Correlations of the first scores with subsequent scores for each area of the test are given below :

Area	Test Internal	
	3 Weeks	8 Weeks
1. Parental value on education and achievement	.75	.71
2. Emotional climate	.79	.73
3. Parental encouragement	.74	.70
4. Educational facilities	.72	.68
	N = 66	N = 66

Split-half Method : The areas 3 and 4 (Parental encouragement and Educational facilities) have 25 items each. The last item is not considered for splitting the test. Alternate items correlation and first half Vs. second half correlations are as follows for each area of the test.

Area	Alternate Items	First Half Vs. Second Half
1. Parental value on education and achievement	.62	.71
2. Emotional climate	.55	.52
3. Parental value	.65	.62
4. Educational facilities	.50	.55
	N = 74	N = 74

Independent samples are used for test-retest and split half methods of establishing reliability.

(g) Scoring of the Items

The items were rated by the students using the five alternatives given below :

1. Not at all	or	Never
2. Slightly	or	Sometimes
3. Moderately	or	Often
4. Considerably	or	Very often
5. Highly	or	Always

In the answer-sheet (Appendix 3) against each item the above five alternatives in terms of numbers (1,2,3,4,5) were given. The student will encircle the number of the alternative that suits him/her best. In the case of positively worded items, the number encircled is taken as the score for that item. In the case of negatively worded items, the scoring is reversed. In the case of reversed scoring (or negative scoring) if 5 is encircled, a score of 1 is given and if 4 is encircled a score of 2 is given. For

example, if 2 is encircled against a particular item, the score for it is -

2, if it is positively worded	1	2	3	4	5
4, if it is negatively worded	5	4	3	2	1
Sum	6	6	6	6	6

The quick way of getting a reversed score for an item is 6 - the circled number. The sum of the circled number and the reversed score is 6. Therefore, by subtracting the circled number from 6, reversed score for that item is got. If there are 'n' items, the reversed score for 'n' items is 6n - the sum of the circled numbers. This is as good as scoring each item reversely and getting the score. This procedure avoids confusion and saves time and energy.

By looking at the answer-sheet (Appendix 3), it will be noticed that the items measuring a particular area are positioned in a particular column. The items 1, 5, ...77 found in column 1 belong to area 1 (Parental value on education and achievement), the items 81, 85, ... 97 of column 1 and the items 2, 6, ... 98 found in column 2 belong to area 2 (Emotional climate), and the items found in columns 3 and 4 belong to areas 3 and 4 (Parental encouragement and Educational Facilities) respectively. In the case of areas 1 and 3 where all the items are positively worded, the sum of the numbers encircled against the related items will give the score for that area. In area 2 there are 30 items negatively worded. By subtracting the sum of the

circled numbers of these items from 180 (= 30 x 6) the score for that area is got. In the case of area 4, 20 items (4, 8, ... 80) are negatively worded and five items (84, 88, ... 100) are positively worded. The score for this area is given by 120 - the sum of the circled numbers against the negatively worded items + sum of the circled numbers against the positively worded items. By scoring the items in the way described, we get the scores that indicate the extent of each variable - extent of parental value on education and achievement, lack of emotional climate (absence of worries or emotional stability or happiness), parental encouragement, and facilities available.

The questionnaire-cum-rating scale is at Appendix 2 and the answer-sheet used is at Appendix 3.

4.3 MEASUREMENT OF SOCIO-ECONOMIC STATUS

(a) Instruments available for measuring Socio-economic Status - A Brief Review

In foreign countries several scales have been developed, using different criteria, for measuring the socio-economic status (SES) of the home. Taussig (1924) developed a scale taking income as the criterion. Bar Scale, a derivative of Taussig scale, laid stress on the intellectual requirements of the occupations. Cattell (1942) and Cantrill (1943) devised scales considering the prestige value of the occupations. Chapin (1928) placed weight on cultural factors of the home namely cultural possessions, effective income, material possessions, and participation in group

activity of the community. The Chapman-Sims scale (1925) from which Sims Score card was developed later, included items on occupation of father, parents' education, number of books in the home, news-papers, and magazines taken and material possessions such as piano, telephone, car, and so on. Leahy's Scale (1936) known as the Minnesota Home Status Index covered six aspects of home background - occupational status, education of parents, economic status, cultural status, sociability, and children's facilities. Warner and his associates (1949) used occupation, source of income, type of housing and neighbourhood and Hollingshead and Redlich (1958) used residential address, occupation and education as criteria for developing their scales.

In Indian context Rahudkar (1960), Freeman (1961), Lewis and Dhillon (1955) and Pareek and Trivedi (1961) developed scales for measuring socio-economic status of rural families; Varma (1962), Pandey (1966) and Kuppuswamy (1962) devised scales for measuring the socio-economic status of urban families.

Rahudkar rated the farm families in Nagpur Extension Block. Freeman's measurement of status of families in Uttar Pradesh was based on material possessions such as land, house, type of house, animals, bullock-cart, cycle, torch, chaff-cutter, iron-plough and watch. Lewis and Dhillon used seven factors as criteria for measuring social status - (1) land owned (irrigated and non-irrigated), (2) land mortgaged, (3) amount of credit and debt, (4) type

of house structure, (5) income from non-agricultural occupation and ownership of, (6) live stock, and (7) bullock-cart. Pareek and Trivedi used as many as nine factors as criteria for assessing social status, namely, (1) caste, (2) occupation of the head of the family, (3) education of the head of the family, (4) social participation of the head of the family, (5) land owned or cultivated, (6) type of house, (7) farm power (live-stock, tractor), (8) material possession (bullock-cart, cycle, radio, chairs, improved agriculture implements, and (9) family (type of family, size, distinctive features).

Varma's criteria of measurement of social status included items on composition of family, educational level of members (particularly female members), source of income and relatives and their social position. Pandey developed a questionnaire for assessing social status using four variables as criteria - (1) education, (2) income, (3) occupation, and (4) caste. Kuppuswamy (1962) developed his scale using only three variables as criteria and this scale was used in the present study considering its popularity, simplicity, objectivety and availability.

(b) Description of Kuppuswamy SES Scale

This scale was developed using three variables as criteria, namely, education, income and occupation of the father or guardian. Each variable was scaled on a seven-point scale and weightages for each of the items in the

variables were determined on the basis of the author's clinical experience and the ratings of the social workers. The final weightages given to each of the items of the variables are shown below :

Items	Weightage (SES Score)
I. Education	
1. Professional degree or Hons.,M.A. and above	7
2. B.A. or B.Sc. degree ...	6
3. Intermediate or Post-High School Diplomas, Diplomas in Oriental Languages like Vidwan	5
4. High School Certificate ...	4
5. Middle School completion ...	3
6. Primary School or literate ...	2
7 Illiterate	1
II. Occupation	
1. Professional ... ... (Doctors, Engineers, Advocates, Senior Administrative Officers, Senior Lecturers, Readers, Professors, Principals of Colleges, Planters owning or managing large estates, Expert Musicians, News-Paper Editors, Auditors, Architects, Managing Directors of industrial and business firms, Bank Managers, etc.)	10
2. Semi-Professional ... (Mechanical and Electrical Engineers of Technological Institutes, High School Teachers, Lecturers in the College, Junior Administrators, Insurance Inspectors, Commission Agents, Musicians, Research Assistants, etc.)	6

Items	Weightage (SES Score)
3. Clerical, Shop-owners, Farm-owners, etc. (Clerk, Typist, Accountant, Elementary School Teacher, Shop-keeper, Farm owner, Station Master, Guard, News Correspondent, Salesman, Insurance Agent, etc.)	5
4. Skilled Worker ... (The mason, carpenter, mechanic, radio serviceman, engine driver, car driver, telephone or telegraph operator, etc.)	4
5. Semi-skilled Worker ... (Factory or Workshop Labourer, Laboratory or Library Attender, Car Cleaner, Petty-Shopkeeper, etc.)	4
6. Unskilled Worker ... (Watchman, Peon, Coolie, Domestic Servant, Farm Labourer, Casual Labourer, etc.)	2
7. Unemployed ... ... (Unemployed dependent irrespective of general or professional education and training, beggar, vagrant.)	1
III. Home	
1. Above Rs. 1000 per month ...	12
2. Between Rs. 750 and Rs. 999 per month	10
3. Between Rs. 500 and Rs. 749 per month	6
4. Between Rs. 300 and Rs. 499 per month	4
5. Between Rs. 101 and Rs. 299 per month	3
6. Between Rs. 51 and Rs. 100 per month	2
7. Below Rs. 50 per month ...	1

The SES was determined by the total score got by adding the individual scores on the three variables - education,

income, and occupation. The total score for any individual on this scale ranged from 3 to 29.

On the basis of the total score the social classes were divided into the following five categories :

	Social Class	Total Score
I	Upper	26 - 29
II	Upper Middle	16 - 25
III	Lower Middle	11 - 15
IV	Upper Lower	5 - 10
V	Lower	Below 5

The scale was standardized on a sample of 623 urban population of Mysore. The validity of the scale was established against external criteria of teachers' and students' ratings and the difference between the means of high and low SES groups (groups identified by ratings and means arrived at on the basis of the scores got on the scale) was found to be statistically significant.

It took 10 to 15 minutes to collect the information about education, income, and occupation of parent or guardian.

A copy of the scale (form used for collecting the three variables of the SES) is found at Appendix 4.

4.4 MEASUREMENT OF NEED FOR ACHIEVEMENT

(a) Instruments available for measuring Need for Achievement - A Brief Review

Of late there has been an increasing interest in the field of motivation - particularly need for achievement (n Ach.). Several tests have been developed to measure n Ach. - modified TAT cards designed by McClelland et al (1953), TAT type test developed by NCERT (Mehta, 1967), n Ach scale of Edwards Personal Preference Schedule (Edwards, 1954), Cattell's Motivation Analysis Test (Cattell et al,1964), Iowa Picture Interpretation Test (Johnston, 1957), Heilbrun Achievement Need Scale (Heilbrun, 1959), derived from an Adjective Check-list devised by Gough, and Sentence Completion Test (SCT) of Mukherjee (1965).

The test-retest reliabilities reported for the McClelland n Ach test for one week (McClelland, 1955) and nine weeks (Krumboltz and Farquhar, 1957) appear to be extremely low. Moreover, the test has the disadvantage of requiring a careful content analysis of Phantasy materials which needs a special professional training and experience. Although this procedure has recently been extended to group administration and objective scoring by French (1958), it still is time consuming and may not yield scores possessing satisfactory reliability (Himelstein and Kimbrough, 1960). The TAT type test developed by NCERT is also not free from subjectivity in scoring. Moreover, this test is not suitable

to college population. Edwards Personal Preference Schedule uses a forced choice format to eliminate the effect of 'response-bias' or faking. Although the matching of the item was designed to eliminate the effect of sociability of the test items, there is some question as to how successfully this has been done (Corah, 1961; Corah et al, 1958; and Dickon, 1959). The low inter-correlations between the items within the n Ach scale as reported by Levonian, Comrey, et al (1959) suggest a poor internal consistency. Motivation Analysis Test developed by Cattell is still in its experimental stage. In Iowa Picture Interpretation Test and Heilbrun Achievement Need Scale no attempt has been made to tackle the problems of faking and malingering. The advantage of SCT of Mukherjee is its objectivity in scoring and ease in administration. It also controls social desirability by employing forced choice triads. SCT is employed in this study for measuring n Ach.

(b) Description of SCT

The SCT consists of 50 forced-choice triads. Wherry's (1945) forced-choice technique was used in developing SCT. About 300 statements were initially prepared and out of which 100 statements had face validity for measuring n Ach since they were specifically written to cover the following ten aspects of achievement motivation : (a) Hope of success, (b) Fear of failure, (c) High standard of excellence, (d) Sense of competition, (e) Optimism, (f) Perseverance,

(g) Interest in making future plans, (h) Concern for creative work, (i) Preference for difficult and challenging tasks, and (j) Identification with a successful authority. The remaining 200 statements were drawn to measure other aspects of manifest needs.

One hundred psychology students rated the social desirability of the statements on a seven-point scale and 10 judges rated on seven-point scale the face validity of the statements for measuring n Ach. Three statements which had more or less same social desirability but two of which had no face validity for measuring n Ach were matched and 76 such triads were established initially. After item analysis, 50 triads were retained. To maintain a non-revealing situation, the instructions on the test sheets gave no information to the subjects as to the purpose of the test and the questionnaire was called sentence completion test (SCT).

Validity : The coefficient of concurrent validity between scores on SCT and scores on n-Ach based on Murray's items was found to be .439 and this is significant at the .01 level. The correlations between SCT scores and Ego Ideal and Need Counteraction Scales derived from Murray Personality Inventory (MPI) are .393 and .394, both significant at the .01 level (Mukherjee, 1965). The construct validity of the test is borne out of a level of Aspiration Study in which subjects scoring high on SCT showed more positive goal discrepancy than subjects having low SCT scores (Mukherjee,

1965). Another study (Mukherjee, 1966) clearly indicated that although two groups were initially equal on a perceptual speed test, with gradual practice, the one with high SCT scores pulled ahead.

Reliability : The reliability of the test was established on four independent samples (Mukherjee, 1965). Test-retest correlations are : Sample 1, N=87 (M=51, F=36), Introductory Psychology class students, 2 months duration r = .71.
Sample 2, N = 58, junior level abnormal psychology class students, 45 days interval, r = .83.
Sample 3, N = 71, different sections of Introductory Psychology class students, 3 months interval, r = .75.
Sample 4, N = 263, different Psychology class students, KR Formula 20 was used, r = .72.

Scoring : Out of the three alternatives provided the subjects have to tick mark on the separate answer-sheet the letter for each triad, that corresponded most with his/her present characteristics or feelings and to cross out the letter that was least true of him/her. The alternatives that correspond to n-Ach in each triad are given in Appendix 7 (Key for SCT). The total tick marks made against correct alternatives will give the n-Ach score. The alternatives crossed by the subjects are not counted.

Time required for Administration of the Test : Try out of the test on 50 college students has revealed that it took nearly 45 minutes to 60 minutes for completing the test.

The SCT is found at Appendix 5 and Answer-sheet used is found at Appendix 6.

4.5 MEASUREMENT OF INTELLIGENCE

(a) Instruments available for Measuring Intelligence - A Brief Review

Several tests - verbal or non-verbal, individual or group - are available for measuring intelligence. Some of the non-verbal tests available are -

(1) Lorge-Thorndike Intelligence Tests : Verbal and Non-verbal Batteries : Form - A

(2) Otis Group Intelligence Scale : Primary Examination : Form - A

(3) Non-language Multi-mental Test by E.L. Terman, Wm. A. McCall, Irving Lorge : Form - A and B

(4) The Southend Group Test of Intelligence : George Harrap and Company

(5) Kuhlmann-Anderson Tests Grade 1, I Semester

(6) Chicago Non-verbal Examination

(7) Madras Non-verbal Test : St. Christopher Training College, Madras, Age 9-13

(8) A Non-verbal Group Test of Intelligence with special reference to Mysore State, Age 7-13 - Premlatha,M.G.

(9) Revised Beta Examination by C.E. Kellog and N.W. Morton

(10) Non-verbal Group Test of Intelligence with special reference to Gujarat State, Age 7-13 years, G.B.Shah

(11) Raven's Progressive Matrices Test

(12) Cattell's Progressive Fair Test of Intelligence, The Institute for Personality and Ability Testing, Campaign, Illinois.

Some of the tests cited are suitable to high school level only. Of the tests suitable to college level Cattell's test was preferred since it is the best factor based test and it was not tried in India earlier for predicting academic achievement.

(b) Description of Culture Fair Intelligence Test

The Cattell's Culture Fair or Culture Free Intelligence Tests, as the name implies, have been developed with the main objective of providing a test as free from contamination by specific cultural learning effects over a wide range of cultural and social differences and as near to measuring innate ability as possible. These tests are designed on the basis of Cattell's theory of fluid general ability in contrast to the traditional concepts of crystallized intelligence.

According to the theory of fluid and crystallized general ability, there is not one general ability factor but

two (Cattell, 1967). It states that these two broad factors are distinguishable by one, called crystallized intelligence, g_c loading most heavily the culturally acquired judgmental skills, while the other, called fluid ability, g_f, is found loading insightful performances in which individual differences in learning experience play little part. The differences between gc and gf, as detailed by Tannenbaum (1965) are given below.

(a) gc is reflected in cognitive performance that has become patterned through earlier learning experiences. gf, on the other hand, manifests itself through adaptive mental behaviour in situations so unfamiliar that previously learned skills can be of no help in guiding such behaviour.

(b) Diversity in cultural interests and opportunities produces more individual differences in gc than in gf, even before biological maturity (age 15-25) has been reached.

(c) Both types of ability reach their growth peaks at different ages, gf levelling off sometime in early adolescence, while gc may continue to grow in late adolescence and early adulthood, depending on the length of participation in cultural pursuits.

(d) Standardized tests measuring gc show a much smaller sigma than does a test like IPAT, measuring gf. The reason is that in a given subculture the previous learning experiences which strongly influence gc scores are so circumscribed that they tend to reduce the variance at a

given age level. One example of the restrictive nature of learning activity may be found in the typical class-room where a wide range of potential is funneled into narrow range performance as bright pupils are restrained from moving ahead and dull pupils are pushed to achieve more than they can.

(e) With gf rooted relatively more in heredity and physiology and gc based relatively more on environmental experience, the latter type of measure will show greater fluctuation in test norms over the years.

Culture Fair Tests, identified as Scale 1, Scale 2 and Scale 3, have been developed to assess general intelligence level over the age range between four years and adulthood. Scale 1 operates over 4 through 8 years, Scale 2 over 8 through 14 years, including average non-college adults and Scale 3 over 14 years and through the superior adult level, being especially suitable for spreading out finely the ability differences of University under-graduate and graduate students.

Scale 3 is a perceptual type of intelligence test, i.e. a test form involving neither reading nor reference to culturally bound pictures (Cattell and Cattell, 1959). It deals with the core of general 'relation education capacity' which has been shown to be (a) largely inborn, (b) relatively constant characteristic (1-Q) for the individual, and (c) operative in quite different fields of content, e.g.,

verbal, numerical, spatial, and social skills. This scale unlike the other Principal culture-free test in used (the Matrices Test), does not depend wholly on one type of sub-test. It avoids the construction error of 'putting all its eggs in one basket' and, instead utilizes four designs of proved validity, thus eliminating, a large scale 'specific' from the score. It has two forms A and B, having four sub-tests in each of the forms.

Number of Items and Time Limit : Items and time allotted to each sub-test are shown below (same for form A or B) (Cattell and Cattell, 1959):

Sub-test	Number of Items	Time allotted as per the original test	Time allotted in Indian Context
1. Series	13	3 minutes	4 minutes
2. Classifications	14	4 minutes	5 minutes
3. Matrices	13	3 minutes	4 minutes
4. Conditions (Topology)	10	4 minutes (Now revised to 2.1/2 minutes)	5 minutes
	50		

In the case of first sub-test (Series), the testee has to complete a sequence of four drawings by choosing one, from among the six options given, that comes next to the three drawings already given. Second sub-test (Classifications)

requires the examinee to pick out two drawings, out of a set of five drawings, that are different from the rest. In the third sub-test (Matrices), matrix has to be completed by choosing one drawing out of six alternatives provided. Fourth sub-test (Conditions) requires the candidate to select, from among the five drawings of over-lapping geometric figures, the one which permits to put a dot in the same position in which it was placed in the model given.

Validity and Reliability : Validity can be viewed as : (1) direct concept (i.e. correlation of the test with the pure factor which it is designed to measure; and (2) direct concrete (i.e. correlation of the test with other known measures of the same ability and with behavioural performances known to be in some way dependent upon or related to the ability measured, such as school performance). Reliability or test consistency can be considered as : (1) homogeneity (internal); (2) dependability (short-term test-retest correlations); and (3) equivalence (inter-form consistency).

Validity and Reliability of the test as reported in the handbook (Cattell and Cattell, 1959) are given below :

Validity

1. Concept validity (correlation between the scales and the pure factor)

Author	Form	Sub-test 1	2	3	4	Total Test
N of Available 202 High School Students	A	.56	.56	.75	.56	.85
	B	.64	.48	.45	.66	.81
	A + B	.74	.64	.81	.71	.94
Cattell R.B., Feingold S.N., and Sarason S.B.		.53	.68	.89	.99	---
Bajard		Between .71 and .84				
Centre de Psychologie Appliquee, France		Between .78 and ,83				

2. Correlation of the test with other tests or performance

Author and Sample	Criterion Test	Correlation
Rodd N 1290 Taiwan and Main Land Chinese students	1. Watson - Gleser Critical Thinking Appraisal	.29
	2. Teachers' Ratings of Intelligence	.22
	3. Total Grade Average	.23
,,	4. Mathematics Test Scores	.32
,,	5. Science Grades	.31
Domino	6. Non-language form of the California Test of Mental Maturity	.56
,,	7. SAT Mathematics Scores	.64

contd...

Domino	8. Gotts Chaldt Figures Test	.55
Barney	9. Freshman Grade Point Average	.45
229 undergraduates	10. High School Average	.21
,,	11. Factor B, General Mental Capacity, of the 16 PF	.31
Bensberg and Sloan ~~Tilton~~ Tilton	12. Stanford Binet	.85
	13. Wechsler Bellevue	.84
	14. Otis	.73
	15. A.C.E.	.59

Reliability

Intra and inter-form consistency of the test is as follows (Cattell and Cattell, 1959) :

Homogeneity coefficients, N = 202 High School Students, Male and Female

Type of Formula	Form of Test		
	A	B	A + B
Spearman-Brown	.68	.64	.78
Cronbach's	.68	.63	.80
K-R Formula 21	.51	.53	.71

Equivalence coefficients, N = 202 High School Students
Male and Female
Interval of one week between
test administration

Form	Sub-test 1	2	3	4	Total Test
A Vs. B	.34	.32	.41	.51	.68
(A+B) Vs. (A+B)*	.51	.49	.58	.68	.81

* Spearman-Brown formula corrected to double form length. These are not precisely equivalence coefficients, but may be though of as lower bound estimates of dependability coefficients for A + B.

The following coefficients reflect simultaneously both equivalence and dependability and two sources of variance are operating to attenuate the correlation coefficient, time variations and form variations.

Dependability and equivalence coefficients, N = 723 boys and N = 567 girls; Interval of one week between test administrations.

Sex	Form of Test A Vs B	(A+B) Vs (A+B)*
Boys	.60	.75
Girls	.55	.71

* Spearman-Brown formula corrected to double form length.

Scoring Principles : One point is given for each item right. If more than one answer is marked for an item in tests, 1, 3 or 4, no credit is given for that item even though one of the responses may be correct. In test 2, there must be two and only two answers to an item, both of which are correct, for the item as a whole to be correct and get one point credit. The total number of correct answers on all the four sub-tests will give the 'total raw score' on each of the forms A or B. If both forms A and B are used, then the individual raw scores on the two forms are to be added to get the total raw score on both the forms.

The right answers for each of the items in sub-test 1 through sub-test 4 of form A or B (same for both the forms) are at Appendix 11 (Key for the test).

In the present study both the forms of the test are used - Scale 3, Form A, 1963 Edition and Scale 3, Form B, 1961 Edition (Second). Form A is at Appendix 8 and Form B is at Appendix 9 and the Answer-sheet used (same for both in forms) is at Appendix 10.

4.6 MEASUREMENT OF PERSONALITY

(a) Instruments available for Measuring Personality - A Brief Review

Personality is measured mainly by four methods - Ratings of observers, Projective tests, Objective tests,

Questionnaires (Warburton, 1961 and 1962). Commonly employed projective tests are : Rorschach Ink-blot Test, Thematic Apperception Test, Pressy XO Tests, Raven's Controlled Projective Test, Lowenfeld Mosaic Test, Bellack's Children's Appreciation Test, Blum's 'The Blacky Pictures', Schneidmann's 'Make a Picture Story', and Rosenzweig's 'Picture Frustration Study'. Objective tests include ability tests, automatic responses, unexpected tasks, puzzling purpose tests, disguised purpose tests, emotional situation tests, emotional content tests, and Physical and Physiological Tests. Some of the questionnaires usually employed are : Woodworth Personal Data Sheet, Cornell Index, Allport Ascendance - submission Reaction Study, Bernreuter Personality Inventory, Minnesota Multi-phasic Inventory, Guilford Factorial Inventories, Gordon Personal Profile, California Psychological Inventory, Edwards Personal Preference Schedule, Maudsley Personality Inventory, Sixteen Personality Factor Questionnaire, etc.

Sixteen personality factor questionnaire has been selected for the present study since it is the best factor based on personality inventory available, it measures as many as sixteen source traits of personality, it was not previously tried in India for predicting academic achievement.

(b) Description of 16 P.F. Questionnaire

The 16 P.F. claims to measure all the main dimensions of personality revealed by factor analysis. "The development

of the 16 P.F. represents and, indeed, reflects a high order of technical skill" and it is the best factor-based personality inventory available (Maurice Lorr, 1965). The sixteen dimensions used are based on considerable research directed to locating unitary, independent, and practically important 'source traits', i.e. traits affecting much of the overt personality (Cattell and Eber, 1957). The whole series of research publications (Cattell, 1946, 1947, 1950, 1956a, 1956b, 1956c) testify to a very broad sampling of the area of personality responses (Cattell, 1946, 1950, 1957); achievement of a true simple structure solution, revealing functionally unitary traits (Cattell, 1952, 1956c; Cattell and Beloff, 1953; Guilford, 1954); thrice checked by independent experiment (Cattell, 1950, 1956a, 1956c); a repeated intensification of item loadings (Cattell, 1956a, 1956c); a standardization of a proper variety of groups (Cattell, 1934; Cattell,Day and Meeland, 1953, 1956); and a systematic accumulation of relations to important criteria (Cattell, 1957; Degan, 1952).

The 16 P.F. has six forms A, B, C, D, E, and F suitable to different levels of education. Forms A and B are suitable to college students. Forms C, D, E, and F are specifically designed for adults of limited education, literacy, or intelligence. Forms C and D (D is in preparation) are shorter and slightly less vocabulary-demanding, while the E and F (low literate forms in preparation) forms are for persons well below the 'normal' educational level.

Forms A and B each consist of 187 items with 3 'buffer' items placed two at the beginning and one at the end, to 'settle' the subjects before the actual contributory items are encountered and to check on test attitude at the end. The items are arranged in a roughly cyclic order determined by a plan to give maximum convenience in scoring by stencil and to insure variety and interest for the examinee. There are 10 to 13 items for measuring each factor. The majority of the items concern interests and preferences. The remaining statements represent the customary self-reports of behaviour. Three alternative answers are provided for each of the items, since the two-alternative 'forced-choice' situation, forbidding any 'middle of the road' compromise, tends to force a distorted distribution and may produce aversion to the test on the part of the examinee. This is particularly the case with the person of average or higher intelligence for whom Forms A and B are designed. Norms for each form and for Forms A and B combined are provided in the form of stens in a norm supplement (Cattell and Eber, 1962b). More technical details of the test are provided in Hand Book (Cattell and Eber, 1957) and a short description of the test is given in the manual (Cattell and Eber, 1962a).

The 16 P.F. measures sixteen primary factors - A B C E F G H I L M N O Q_1 Q_2 Q_3 Q_4 - and four second-order factors. The last four primary factors have Q symbols because, unlike A through O, they have been found in questionnaire responses only (just as D, J and K have been found, reciprocally, in

ratings but not in questionnaires and hence omitted). Factors A through O are found beyond the questionnaire realm, notably in ratings in real-life behaviour situations, in the objective analytic factor battery, in social response patterns and in abnormal, pathological behaviour.

Capsule Descriptions of the Sixteen Primary Personality Factors and Four Second-order Factors : (More technical titles are Parentheses) : The definitions and interpretations of sixteen primary factors, with two types of nomenclature - popular and professional, and four second-order factors are given below :

FACTOR 'A'

LOW SCORE DIRECTION	HIGH SCORE DIRECTION
Reserved, detached, critical, (Vs) Cool. (Sizothymia, Previously Schizothymia)	Outgoing, Warm-hearted, Easy-going, Participating. (Affectothymia, Previously Cyclothymia)
The person who scores low (sten of 1 to 3) on Factor A tends to be stiff, cool, skeptical, and aloof. He likes things rather than people, working alone, and avoiding compromises of view-points. He is likely to be precise and 'rigid' in his way of doing things and in personal standards, and in many occupations these are desirable traits. He may tend, at times, to be critical, obstructive, or hard.	The person who scores high (sten of 8 to 10) on Factor A tends to be goodnatured, easy-going, emotionally expressive (hence naturally Affecto-thymia) ready to cooperate, attentive to people, soft-hearted, kindly adaptable. He likes occupations dealing with people and socially impressive situations. He readily forms active groups. He is generous in personal relations, less afraid of criticism, better able to remember names of people.

FACTOR 'B'

Less Intelligent, Concrete-thinking (Lower scholastic mental capacity)	(Vs)	More Intelligent, Abstract-thinking, Bright (Higher scholastic mental capacity)
The person scoring low on Factor B tends to be slow to learn and grasp, dull, given to concrete and literal interpretation. His dullness may be simply a reflection of low intelligence, or it may represent poor functioning due to psychopathology.		The person who scores high on Factor B tends to be quick to grasp ideas, a fast learner, intelligent. There is some correlation with level of culture, and some with alertness. High scores contraindicate deterioration of mental functions in pathological conditions.

FACTOR 'C'

Affected by feelings, Emotionally less stable, Easily upset (Lower ego strength)	(Vs)	Emotionally Stable, Faces Reality, Calm, Mature (Higher ego strength)
The person who scores low on Factor C tends to be low in frustration tolerance for unsatisfactory conditions, changeable and plastic, evading necessary reality demands, neurotically fatigued fretful, easily emotional and annoyed, active in dissatisfaction having neurotic symptoms (Phobias, sleep disturbances, psychosomatic complaints, etc.). Low Factor C score is common to almost all forms of neurotic and some psychotic disorders.		The person who scores high on Factor C tends to be emotionally mature, stable realistic about life, unruffled, possessing ego strength, better able to maintain solid group morale. Sometimes he may be a person* making a resigned adjustment to unsolved emotional problems.

* Shrewd clinical observers have pointed out that a good C level sometimes enables a person to achieve effective adjustment despite an underlying psychotic potential.

FACTOR 'E'

Humble, Mild, Accommodating, (Vs) Assertive, Independent, Conforming (Submissiveness) Aggressive, Stubborn (Dominance)

The person who scores low on E tends to give way to others, to be docile, and to conform. He is often dependent confessing, anxious for obsessional correctness. This passivity is part of many neurotic syndromes.

The person who scores high on Factor E is assertive, self-assured, and independent-minded. He tends to be austere, a law to himself, hostile or extrapunitive, authoritarian (managing others), and disregards authority.

FACTOR 'F'

Sober, Prudent, Serious, (Vs) Happy-go-lucky, Impulsively Taciturm (Desurgency) Lively, Gay, Enthusiastic (Surgency)

The person who scores low on Factor F tends to be restrained, reticent, introspective. He is sometimes dour, pessimistic, unduly deliberate, and considered smug and prinny correct by observers. He tends to be a sober, dependable person.

The person who scores high on this trait tends to be cheerful, active, talkative, frank, expressive, effervescent, carefree. He is frequently chosen as an elected leader. He may be impulsive and mercurial.

FACTOR 'G'

Expedient, Evades Rules, (Vs) Conscientious, Persevering, Feels Few Obligations Staid, Rulebound (Stronger (Weaker supergo strength) supergo strength)

The person who scores low on Factor G tends to be unsteady in purpose. He is often casual and lacking in effort for group undertakings and cultural demands. His freedom from group influence may lead to anti-social acts, but at times makes him more effective, while his refusal to be bound by rules causes him to have less somatic upset from stress.

The person who scores high on Factor G tends to be exacting in character, dominated by sense of duty, persevering, responsible, planful, 'fills the unforgiving minute.' He is usually conscientious and moralistic, and he prefers hard-working people to witty companions. The inner 'categorical imperative of this essential supergo (in the psychoanalytic sense) should be distinguished from the superficially similar 'social ideal self' of Q_3+.

FACTOR 'H'

Shy, Restrained, Diffident, (Vs) Timid (Threctia)

The person who scores low on this trait tends to be shy, withdrawing, cautious retiring, a 'wallflower'. He usually has inferiority feelings. He tends to be slow and impeded in speech and in expressing himself, dislikes occupations with personal contacts, prefers one or two close friends to large groups, and is not given to keeping in contact with all that is going on around him.

Venturesome, Socially-bold, Uninhibited, Spontaneous (Parmia)

The person who scores high on Factor H is sociable, bold, ready to try new things, spontaneous, and abundant in emotional response. His 'thick-skinnedness' enables him to face wear and tear in dealing with people and grueling emotional situations, without fatigue. However, he can be careless of detail, ignore danger signals, and consume much time talking. He tends to be 'pushy' and actively interested in the opposite sex.

FACTOR 'I'

Tough-minded, Self-reliant, (Vs) Realistic, No-nonsense (Harria)

The person who scores low on Factor I tends to be practical, realistic, masculine, independent, responsible by skeptical of subjective, cultural elaborations. He is sometimes unmoved, hard, cynical, smug. He tends to keep a group operating on a practical and realistic 'nonsense' basis.

Tender-minded, Dependent, Over-protected, Sensitive (Premsia)

The person who scores high on Factor I tends to be tender-minded, day-dreaming, artistic, fastidious, feminine. He is sometimes demanding of attention and help, impatient, dependent, impractical. He dislikes crude people and rough occupations. He tends to slow up group performance, and to upset group morale by unrealistic fussiness.

FACTOR 'L'

Trusting, Adaptable, Free of Jealousy, Easy to Get on with (Alaxia)	(Vs)	Suspicious, Self-opinionated, Hard to Fool (Protension)
The person who scores low on Factor L tends to be free of jealous tendencies, adaptable, cheerful, uncompetitive, concerned about other people, a good team worker.		The person who scores high on Factor L tends to be mistrusting and doubtful. He is often involved in his own ego, is self-opinionated and interested in internal, mental life. He is usually deliberate in his actions, unconcerned about other people, a poor team member.

N.B.:- This factor is not necessarily paranoid. In fact, the data on paranoid schizophrenes are not clear as to typical Factor L value to be expected.

FACTOR 'M'

Practical, Careful, Conventional, Regulated by External Realities Proper (Praxernia)	(Vs)	Imaginative, Wrapped up in Inner Urgencies, Careless of Practical Matters Bohemian (Autia)
The person who scores low on Factor M tends to be anxious to do the right things, attentive to practical matters, and subject to the dictation of what is obviously possible. He is concerned over detail, able to keep his head in emergencies, but sometimes unimaginative.		The person who scores high on Factor M tends to be unconventional, unconcerned over everyday matters. Bohemian, self-motivated, Imaginatively creative, concerned with 'essentials', and oblivious of particular people and physical realities. His inner directed interests sometimes lead to unrealistic situations accompanied by expressive outbursts. His individuality tends to cause him to be rejected in group activities.

FACTOR 'N'

Forthright, Natural, Artless, Sentimental (Artlessness) (Vs) Shrewd, Calculating, Worldly, Penetrating (Shrewdness)

The person who scores low on Factor N tends to be unsophisticated, sentimental, and simple. He is sometimes crude and awkward, but easily pleased and content with what comes, and is natural and spontaneous.

The person who scores high on Factor N tends to be polished, experienced, worldly, shrewd. He is often hardheaded and analytical. He has an intellectual, unsentimental approach to situations, an approach akin to cynicism.

FACTOR 'O'

Placid, Self-assured, Confident, Serene (Untroubled adequacy) (Vs) Apprehensive, Worrying, Depressive, Troubled (Guilt proneness)

The person who scores low on Factor O tends to be placid, with unshakable nerve. He has a mature, unanxious confidence in himself and his capacity to deal with things. He is resilient and secure, but to the point of being insensitive of when he is not going along with him, so that he may evoke antipathies and distrust.

The person who scores high on Factor O tends to be depressed, moody, a worrier, full of foreboding, and brooding. He has a childlike tendency to anxiety in difficulties. He does not feel accepted in groups or free to participate. High Factor O score is very common in clinical groups of all types (See Handbook)

FACTOR Q_1

Conservative, Respecting Established Ideas, Tolerant of Traditional Difficulties (Conservatism) (Vs) Experimenting, Critical, Liberal, Analytical, Free-thinking (Radicalism)

The person who scores low on Q1 is confident in what he has been taught to believe, and accepts the 'tried and true', despite inconsistencies, when something else might be better. He is cautious and compromising in regard to new ideas. Thus he tends to oppose and postpone change, is inclined to go along with tradition, is more conservative in religion and politics, and tends not to be interested in analytical 'intellectual' thought.

The person who scores high on Factor Q1 tends to be interested in intellectual matters and has doubts on fundamental issues. He is skeptical and inquiring regarding ideas, either old or new. He tends to be more well informed, less inclined to moralize, more inclined to experiment in life generally, and more tolerant of inconvenience and change.

FACTOR Q_2

Group-dependent, A 'Joiner' and Sound Follower (Group Adherence) (Vs) Self-sufficient, Prefers own Decisions, Resourceful (Self-sufficiency)

The person who scores low on Factor Q2 prefers to work and make decisions with other people, likes and depends on social approval and admiration. He tends to go along with the geoup and may be lacking in individual resolution. He is not necessarily gregarious by choice; rather he needs group support.

The person who scores high on Factor Q2 is temperamentally independent, accustomed to going his own way, making decisions and taking action on his own. He discounts public opinion, but is not necessarily dominant in his relations with others (See Factor 'E'). He does not dislike people but simply does not need their agreement or support.

FACTOR Q_3

Undisciplined, Self-conflict, Careless of Protocol, Follows own Urges (Low Integration) (Vs) Controlled, Socially precise, Following Self-image (High Self-concept control)

The person who scores low on Factor Q3 will not be bothered with will control and regard for social demands. He is not overly ~~demam~~ considerate, careful, or painstaking. He may feel maladjusted, and many maladjustments (especially the affective, but not the paranoid) show Q_3.

The person who scores high on Factor Q3 tends to have strong control of his emotions and general behaviour, is inclined to be socially aware and careful, a and evidences what is commonly termed 'self-respect' and regard for social reputation. He sometimes tends, however, to be obstinate. Effective leaders, and some paranoids, are high on Q3.

FACTOR Q_4

Relaxed, Tranquil, Torpid, Unfrustrated (Low ergic tension) (Vs) Tense, Frustrated, Driven, Overwrought (High ergic tension)

The person who scores low on Factor Q4 tends to be sedate, relaxed, composed, and satisfied (not frustrated). In some situations, his over-satisfaction can lead to laziness and low performance, in the sense that low motivation produces little trial and error. Conversely, high tension level may disrupt school and work performance.

The person who scores high on Factor Q4 tends to be tense, excitable, restless, fretful, impatient. He is often fatigued, but unable to remain inactive. In groups he takes a poor view of the degree of unity, orderliness, and leadership. His frustration represents an excess of stimulated, but undischarged drive.

Second-order Factors

FACTOR I

Low Score Direction Low Anxiety (Adjustment)	Vs	High Score Direction High Anxiety
The person who scores low on this factor tends to be one whose life is generally satisfying and one who is able to achieve those things that seem to him to be important. However, an extremely low score can mean lack of motivation, for difficult tasks, as is generally known in studies relating anxiety to achievement.		The person who scores high on this Factor is high on anxiety as it is commonly understood. He need not be neurotic, since anxiety could be situational, but it is probable that he has some maladjustment, i.e. he is dissatisfied with the degree to which he is able to meet the demands of life and to achieve what he desires. Very high anxiety is generally disruptive of performance, and productive of physical disturbances.

FACTOR II

Introversion	Vs	Extraversion
The person who scores low on Factor II tends to be shy, self-sufficient, and inhibited in interpersonal contacts. This can be either a favourable or unfavourable finding, depending upon the particular situation in which the person is expected to function; e.g. introversion is a favourable predictor of precision workmanship.		The person who scores high on this Factor is a socially outgoing, uninhibited person, good at making and maintaining interpersonal contacts. This can be very favourable in situations that call for this type of temperament, e.g. salesmanship, but should not be considered necessarily favourable as a general predictor, e.g. of scholastic achievement.

FACTOR III

Tenderminded Emotionality	Vs	Alert Poise
The person who scores low on Factor III is likely to be troubled by pervasive emotionality, and may be of a discouraged, frustrated type. He is however, sensitive to the subtleties of life, likely to be artistic and rather gentle. If he has problems, they often involve too much thought and consideration before action is taken.		The person who scores high on this Factor is likely to be an enterprising, decisive, and resilient personality. However, he is likely to miss the subtle relationships of life, and to orient his behaviour too much toward the obvious. If he has difficulties, they are likely to involve rapid action with insufficient consideration and thought.

FACTOR IV

Subduedness	Vs	Independence
The person who scores low on Factor IV is a group dependent, chastened, passive personality. He is likely to desire and need support from other persons, and likely to orient his behaviour toward persons who give such support.		The person who scores high on this Factor tends to be an aggressive, independent, daring, incisive person. He will seek those situations where such behaviour is at least tolerated and possibly rewarded, and is likely to exhibit considerable initiative.

Validity : Concept validity of the factors (A and B Forms together) estimated from loadings and from correlation of two factor halves vary between .74 and .96 respectively (Cattell and Eber, 1957, p.4). Direct validities for Forms A and B and A or B alone for each factor vary between .74 and .92, and .58 and .87 respectively. Circumstantial validities (rank difference correlations between corresponding theoretical and actual correlations of the factor with all fifteen other factors) of the factors of Forms A or B alone vary between .42 and .99 (Cattell and Eber, 1962a, p.8).

Reliability : The reliabilities of factors, as dependability coefficients (test-retest correlations) after a six-day lapse, on 146 adults (25-45 years) for Forms A+B, A and B vary between .82 and .93, .61 and .83, and .60 and .89 respectively. Stability coefficients (test-retest correlations) on 132 students after a lapse of two months for each factor of forms A + B vary between .63 and .88. Homogeneity coefficients (internal) on 218 college students for factors of Form A, employing Spearman Brown formula and Cronbach's α, vary between .06 and .78 and .07 and .78 respectively, whereas for Form B the coefficients vary between .16 and .81 and .18 and .80 respectively. The equivalence coefficients of the factors between A and B Forms on 230 male college students vary between .34 and .76 (Cattell and Eber, 1962a, pp. 6 and 7).

Scoring : Each answer scores 0, 1 or 2 points, except the factor B answers which score 0 (incorrect) or 1 (correct). The score of each single item contributes to only one factor total. The arrangement of items in test forms with respect to factors (which items measure which factor and which alternatives get which score) is found at Appendix 17.

Try-out of the Test in India

(i) Validity : 16 P.F. Form A was tried in India at Indian Statistical Institute, Calcutta, on 50 post-graduate science students of Allahabad University (Bhagaliwal,1960). Seventeen items were partially modified or totally changed to make them suitable to Indian population. On the basis of item analysis - dividing the sample into high and low on the scores on each factor and applying X^2 test, it was found that 23 items are not suitable to Indian xontext. The unsuitable items range from 1 to 3 for each factor, exception being on three factors (Q1, Q2, and Q3) where all the items are suitable. The factor correlations between original and revised form (omitting 23 items) vary between .91 to 1.00. It has been concluded that 16 P.F. is appropriate in Indian context for measuring personality and that 'any conclusion based on original or revised scores will be almost equally reliable for individual assessment' (Bhagaliwal, 1960, p.5) since the correlation between original and revised form is very high.

(ii) Reliability : With the exception of Factor B, all other factors have high reliability coefficients (K-R Formula 20) ranging from .71 to .95 for both original and revised forms. In the case of Factor B the coefficients are as low as .44 and .54 for original and revised forms respectively. This indicates the necessity of modifying the items in this factor (intelligence) (Bhagaliwal, 1960, p.4).

(iii) Modifications made in the Present Study :

(1) Modification of Certain Items : Since it was already proved that the test is working well (Bhagaliwal, 1960), it was thought that the original 16 P.F. can be employed with slight modification of certain words. Both Forms A (1962 edition) and B (1961 edition) were given to three judges who had considerable experience in guiding research in Education and Psychology and they were requested to express their opinion about the suitability of the items to Indian context. The judges have expressed that the test can be used with slight modification of certain items. Keeping in view the modifications already made by Indian Statistical Institute and also the opinion expressed by the judges, the following modifications are made in Forms A and B :

Form 'A' : Item 36 - The word 'dance' is omitted.
Item 51 - The word 'grammar' is replaced by 'public'.
Item 115- 'Concerts, opera' are replaced by 'musical performance'.
Item 133- 'Foolhardy' is replaced by 'rash and bold things'.
Item 141- 'air planes' is peplaced by 'bicycles'.

The following items are partly modified as follows :

Item 13 - I can generally put up with people who have high opinion of their abilities, even though they boast or show that they think very high of themselves. (a) Yes (b) In between (c) No.

Item 25 - I never feel the urge to be restless or uneasy or to draw or scribble idly when kept sitting still at a meeting.
(a) True (b) Uncertain (c) False.

Item 38 - I believe most people are a little mentally strange or peculiar though they do not like to admit it. (a) Yes (b) In between (c) No.

Item 96 - During my college course, I tried to mix freely with opposite sex.
(a) A lot (b) As much as most people
(c) Less than most people.

Item 110 - I have approximately an equal number of friends from both the sexes
(a) Yes (b) In between (c) No.

Form 'B' : Item 137 - 'Television vandeville show' is replaced by 'radio talks or plays'.

(2) Provision of Meanings for Difficult Words :

With the modifications referred to above Forms A and B are tried on 100 college students. They were requested to note down the words or items as such they are not able to follow.

Analysis of the writings of the students has revealed that (a) there are no items which are totally not understood, and (b) there are certain words, in certain items, which are not understood. The words that are difficult to understand are noted and the extent of difficulty in terms of number of persons who are not able to understand each word is counted. It is decided that meanings should be provided for the words which have been found difficult by 5 % and more of the students. The words so identified are underlined with red pencil in Forms A and B and these forms are given to three Lecturers who are teaching Telugu to Degree Class students. They were requested to read the words underlined and provide meanings for them in Telugu. The meanings provided by the three Lecturers independently are similar in majority of the cases. Finally, the researcher had arranged a meeting among the three Lecturers and the meanings for the words for which there was disagreement among them previously were finalized. The meanings are provided as an Appendix to the relevant form. A copy of the Form A (1962 edition) is at Appendix 12 and the meanings of the difficult words are at Appendix 13. A copy of Form B (1961 edition) is at Appendix 14 and the meanings of the difficult words are at Appendix 15. The Answer-sheet (same for both the forms) is at Appendix 16.

Time for Administration of Each Form : Though it was not a timed test, it was stated that 35 to 40 minutes are enough for each form for American population. Try out of the test on Indian College students has revealed that nearly 70 to 90 minutes are necessary since Indian students are not test sophisticated.

Having, thus, chosen the tests described above for the study, they are administered and scores are obtained. In the next chapter, the method of administration of tests, collection of data and the statistical techniques employed in the study are described.