CHAPTER IV

DESCRIPTION OF TOOLS

INTELLIGENCE MEASURES

1. KERALA UNIVERSITY VERBAL GROUP TEST OF INTELLIGENCE

2. KERALA NON-VERBAL GROUP TEST OF INTELLIGENCE FOR SECONDARY SCHOOLS

CREATIVITY MEASURE

KERALA UNIVERSITY TEST OF CREATIVE THINKING

PERSONALITY MEASURES

1. KERALA UNIVERSITY PERSONALITY SCALE

2. KERALA UNIVERSITY GENERAL ANXIETY SCALE

3. KERALA UNIVERSITY TEST ANXIETY SCALE
4.0 DESCRIPTION OF TOOLS

The present study involved a series of procedures whereby the general sample identified for the study was reduced to two extreme groups for comparison - the high intelligence - high creative and the high intelligence-low creative and the obtaining of factor structures with respect to the defined set of personality variables. The different procedures necessitated the use of (a) intelligence measures for identifying the high-intelligence group in the general sample; (b) creativity measures for identifying the high- and low-creative groups within the high-intelligence group identified as above; and (c) the different personality measures in terms of which the factor structures for the two groups under comparison were obtained.

The three categories of tests used in the study are described in some detail.

4.1 INTELLIGENCE MEASURES

The identification of the high-intelligence group within the general sample was done with the help of two different criteria - scores on a verbal group test of intelligence and a non-verbal group test of intelligence - these are described below:

1. KERALA UNIVERSITY VERBAL GROUP TEST OF INTELLIGENCE

This test is one of the most popular group tests in Malayalam for use with secondary school subjects in Kerala.
This test is till date the only available verbal group test of intelligence in Malayalam for this age-group. The technical details regarding the test are reported in the test manual. 1

The test is composed of five sub-tests, a brief description of which is attempted below:

(i) Verbal Analogy

In each item of this sub-test, three words are given of which the first two words suggest a relationship. The subject has to select the fourth word (from the choices given) which is such that the relationship which connects the first two words is to hold between the third and fourth words. An English translation of a sample item of this sub-test is given below:

Train: Station :: Ship: ______

( (a) Sea  (b) Lake  (c) Harbour  (d) Boat)

Note: Correct answer is (c)

The test consists of twenty items, and the time limit specified for this sub-test is six minutes. One score is given for each correct response. Thus the total maximum possible score for this sub-test is twenty.

(ii) Verbal Classification

In each item of this sub-test, five words are given of which four can be grouped together according to some bind-

ing principle or law. The subject has to find out the word that does not belong to the group. An example is given below:

(a) Addition     (b) Subtraction
(c) Multiplication (d) Arithmetic
(e) Division

Note: Correct answer is (d)

There are twenty items, and the time limit is five minutes with one score being given to each correct response. The total score in this sub-test is twenty.

(iii) Proverbs

Each item of this sub-test consists of a proverb followed by four statements, each of which is intended as an explanation of the meaning of the proverb. The subject has to choose the statement which conveys best the meaning of the proverb. An example of an item from this sub-test (exact translation into English is not possible for this item type and hence the nearest English equivalent is given) is given below:

Slow and steady wins the race.

(a) Anyone who proceeds steadily in a race will always win in the end.

(b) If we do something in a calculated and planned manner, we can finish any work, however hard it might be.

(c) If any work is done steadily, slow pace will not matter.

(d) Any work which is done slowly is always good.
There are twenty items in this sub-test. The time allowed for answering all of them is eight minutes. One score is given for each correct response. The total maximum possible score in this sub-test is twenty.

(iv) **Number Series**

In each item of this sub-test, a series of numbers, formed according to certain law, is given. One of the terms in the series is missing. The subject has to find out the missing term (number) from a set of alternate answers given.

An example of this item type is given below:

5, 9, 13, 17, 21, ......

((a) 25 (b) 34 (c) 17 (d) 5))

Note: Correct answer is (a)

This sub-test also consists of twenty items and the time limit specified for answering those twenty items is six minutes. One score is given for each correct response. The total score in this sub-test is twenty.

(v) **Arithmetical Reasoning**

This sub-test contains verbal problems requiring the perception of some sort of relationship. The subject has to identify the relationship and select the correct answer to the problem from the given alternatives. An example is given below:
Rani is older than Ruby. Leena is older than Rani. Who is the oldest among the three?

((a) Rani (b) Ruby (c) Leena))

Note: Correct answer is (c).

There are twenty items in all; the total time allowed for this sub-test is ten minutes. One score is given for each correct response. The maximum possible score in this sub-test is twenty.

Validity and Reliability of the Test

The validity and reliability coefficient reported in the test manual is high. The reliability coefficient worked out in another study\(^2\) shows that the test-retest reliability is 0.79, the interval between test-retest being one month and \(N = 86\).

Validity of the test, as may be seen from the test manual, has been ensured first by adopting components of proved merit from other tests and partly by ensuring high internal validity attained through item analysis. Further the intercorrelations of the five sub-tests of the battery (\(N = 120\)) correlate high among themselves, thus showing that the different sub-tests overlap. The matrix of inter-correlation is given in Table XII.

### TABLE XII  CORRELATION MATRIX OF THE SUB-TESTS OF THE VERBAL GROUP TEST OF INTELLIGENCE

<table>
<thead>
<tr>
<th>Test</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Analogy</td>
<td></td>
<td>0.75</td>
<td>0.66</td>
<td>0.45</td>
<td>0.56</td>
</tr>
<tr>
<td>2. Classification</td>
<td></td>
<td></td>
<td>0.63</td>
<td>0.47</td>
<td>0.41</td>
</tr>
<tr>
<td>3. Proverbs</td>
<td></td>
<td></td>
<td></td>
<td>0.47</td>
<td>0.41</td>
</tr>
<tr>
<td>4. Number Series</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.32</td>
</tr>
<tr>
<td>5. Verbal Reasoning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The lower part of the matrix is omitted.

Several important studies conducted with this test indicate that the test is a highly successful predictor of different forms of achievement. Further it correlates well with other established measures of intelligence like the PMT.

The factorial composition of the test has been assessed in an independent study by Kurup. The study revealed that it is composed of three main factors: a 'V-ed' factor (Verbal-Education Factor), accounting for seventy nine percent, an 'I' factor (Inductive reasoning), which accounted for thirteen percent and a 'K' factor (space-perception), which accounts for nearly eight percent of the variance of the battery. Still another factor study of the same test by Nair shows that it has a high 'g' saturation. The 'g'

---

saturation of the test has been calculated in this study using Spearman's method. The test manual provides norms for a state-wise standardization sample.

2. KERALA NON-VERBAL GROUP TEST OF INTELLIGENCE FOR SECONDARY SCHOOLS

This test, again, is one of the most popular of standardized Non-Verbal Group Test of Intelligence, available for use with secondary school pupils of Kerala. The validity, reliability etc. of the test are provided in the test manual. This test was used as another criteria for identifying the high-intelligence group. This test is composed of four sub-tests, a brief description of which is given below:

(i) Figure Classification

In each item of this sub-test, five figures marked A, B, C, D and E are given with abstract figures in each. Four of them can be grouped together according to a certain principle, while one will 'stand out' of the group. The subject is asked to find out the figure which does not belong to the group.

The following is an example of an item in this sub-test.

\[
\begin{align*}
A & \quad B & \quad C & \quad D & \quad E \\
\end{align*}
\]

Note: Correct answer is (c).

There are twenty items of this kind out of which only sixteen are used for scoring. Four items are given (along with their answers) as demonstration items with instructions in both Malayalam and English. The subject has to work out the sixteen items within the specified time limit of five minutes. One score is given for each correct response.

(ii) Figure Series

Each item of this sub-test consists of five small squares arranged in a row. Four squares contain certain abstract figures, while the last square is empty. The subject has to find out the figure which when placed in the empty square will complete a design (or complete the series). Four alternate answers are supplied, the subject has to choose one from this. The figure in the design follow a certain law. Looking at the first four figures, the subject has to find out what would follow as the fifth figure (fifth term) of the given series.

An example of an item in this sub-test is given below:

Note: Correct answer is (B)

Here also the subject has to answer 16 items in five minutes. Four items are given at the beginning as demonstration items, which makes the total number of items in the sub-test into twenty. Written instructions are provided both in
Malayalam and English. The subject has to find out answers to the sixteen items within the prescribed time limit of five minutes. One score is given for each correct response.

(iii) Figure Analogies

In each item of this sub-test, there are four squares arranged in a row. The first three contain small abstract figures whereas the last square is left blank. The squares are divided into two groups - the first two on the left and other two on the right. The figures contained by the pair on the left indicate a relationship. The same relationship is assumed to hold for the pair of squares on the right as well. Applying the relationship connecting the figures of the left pair of squares, the subject has to decide the figure which should come in the blank square on the right. The subject has to select his answer from a set of four alternatives given.

Example of an item under this sub-test is given below:

```
Problem

Answer

A
B
C
D

Note: Correct answer is (B).
```

As in the other two sub-tests, there are sixteen items and another four given as demonstration items with written instructions, making the total number into twenty. The subject has to work out the sixteen items in five minutes. A score of one is given for each correct response.
(iv) Figure Matrices

In each item of this sub-test, there are nine squares arranged in the form of a matrix of three rows and three columns. The matrix of nine squares put together form a design. In the bottom row right hand square is vacant while the other squares contain certain abstract figures. The subject is asked to examine the square in each row and find out the principle (relationship) connecting the figures in the first and second rows and use the common principle in the two rows to find out the figure that has to come in the vacant square in the third row. The subject is also permitted to analyse the figure in terms of columns in the place of rows. A set of four alternative answers is given from which the subject can choose one.

An example of an item in this sub-test is given below:

Problem

Answer

Note: The correct answer is (B)
There are sixteen items in this sub-test with another four serving as demonstration items. Written instructions are provided in both Malayalam and English for the demonstration items. The subject has to find out answers to the sixteen items within the specified time limit of five minutes. One score is given for each correct response.

Non-verbal Intelligence Score

The total scores of all the four sub-tests (described above) gives the total non-verbal intelligence score of a subject.

Validity and Reliability

The test is a highly valid and reliable tool as may be seen from the test manual. Data relating to the factorial validity of the test is available from two different studies.\(^6,7\) Factor Analysis has shown that the test battery is composed basically of two main factors, viz., 'V-ed' factor (which is a close approximation of Spearman's 'g' factor) and a less important 'K' factor.\(^8\)

Further evidence of the validity of the test is available in terms of construct validity, internal validity as evidenced by item development and item selection, and also

---


in terms of external criteria like PMT \((r = +0.78)\) and KUVGT \((r = +0.73)\).

The split-half reliability coefficient of this test is +0.88 \((N = 75)\) and test-retest reliability is +0.75 \((N = 100)\). The test manual provides different types of norms including Deviation IQ's for representative age levels.

4.2 MEASUREMENT OF CREATIVITY

THE KERALA UNIVERSITY TEST OF CREATIVE THINKING

The Kerala University Test of Creative Thinking\(^9\) was used for classifying the high-intelligence group into 'High-creative thinkers' and 'Low-creative thinkers'. This test is the first test of creative thinking developed for use with Kerala Secondary School students. This has been modelled after the well-known Guilford's Test of Creative Thinking\(^10\) and makes use of Malayalam, the regional language of Kerala.

The Kerala University Test of Creative Thinking has 15 sub-tests, a brief description of which is attempted below:

(i) Suffixes: Write words ending with a specified Malayalam suffix

(ii) Prefixes: Write words beginning with a specified Malayalam Prefix

---


(iii) First and Last Letter: Write words beginning and ending with a specified letter of the Malayalam alphabet.

(iv) First Letter: Write words beginning with a specified letter of the Malayalam alphabet.

(v) Topics: Write as many ideas as possible about a given topic: e.g., 'Reading habit', 'Unemployment among the educated class' etc.

(vi) Thing Categories: List the names of things which fit a given description: e.g., 'that could be called round', 'that could be called dangerous' etc.

(vii) Usual and Unusual Uses: Write usual and unusual uses of the given objects. Examples of items in this sub-test are cigarette tin, bulb etc.

(viii) Word Arrangements: Write three-word sentences when the first letter of each word is given.

(ix) Associational Fluency: Write as many synonyms as possible for each given word. Examples of items in this sub-test are Face, Mother, Tree, Lotus, Bird etc.

(x) Associations: Produce words that can be associated with two given words. Examples of items are (i) Book, Pencil; (ii) Field, Plough etc.

(xi) Plot Titles: Write clever titles for given story plots. (Outline given in about 10 sentences)

(xii) Consequences: List remote consequences of certain changes. Examples: What would happen if a man could be invisible at will? What would happen if the language of birds and animals could be understood by man?
(xiii) Apparatus Test: Suggest improvements for common appliances. Examples of items in this sub-test are Electric bulb, Fountain pen, Writing paper etc.

(xiv) Concealed Figures: Write the number of triangles, and rectangles contained in the given squares.

Example

1

![Triangle and Rectangle Diagram](image1)

2

![Triangle and Rectangle Diagram](image2)

(xv) Cube Fluctuations: Indicate the number of changes in perspective of an ambiguous cube presented.

Example

![Cube Diagram](image3)
Time limit was imposed for each sub test of the creative thinking test as described in the test manual.

SCORING SCHEME OF THE KERALA UNIVERSITY TEST OF CREATIVE THINKING

The different sub-tests of the creativity test is scored for fluency, flexibility and originality. These three types of scores are classified as fluency score, flexibility score and originality score. The sum of all the three types of scores yield the total score of the creativity test. The method of obtaining each type of score is described below:

(i) Scoring scheme for Fluency

A score for fluency is obtained simply by counting the number of responses, excluding repeated responses only. Relevancy adequacy, or quality of responses are not considered here. In scoring for fluency, one score is given for each correctly written word, excluding those repeated.

(ii) Scoring Scheme for Flexibility

Flexibility means the number of categories to which responses belong, when the responses are classified on the basis of certain standard principles. Categorization, for different sub-tests are based on different principles. A score of one is given for each of the categories, provided the sub-

ject writes at least one word in that category.

(iii) Scoring Scheme for Originality

For the purpose of scoring, originality is considered to be uncommonness of responses in a statistical sense. The following principle is adopted for scoring the responses for originality.

Responses are classified into five groups and scoring is done for the five groups as shown below:

(i) Those which are included in the responses of twelve per cent or more of the general group. (Zero score for each response).

(ii) Those which are included in the responses of five to twelve per cent of the general group. (One score for each correct response).

(iii) Those which are included in the responses of two to five per cent of the general group. (Two scores for each correct response).

(iv) Those which are included in the responses of one to two per cent of the general group. (Three scores for each correct response).

(v) Those which are included in the responses of less than one per cent. (A score of four is given for each correct response).

The manual of instructions states that the grouping of words was done on the basis of the frequency counts of responses of 500 secondary school subjects in Kerala.
Validity and Reliability of the Creativity Test

No special validity or reliability studies have been conducted for the tool till the present investigator thought of validating it against a more recent creativity scale developed by two other investigators in Kerala. This scale by Nair and Sanandaraj¹² is another creativity measure with the following sub tests:

Word Fluency, Prefixes, Ideational Fluency, Remote consequences, Associational Fluency, Unusual uses, Product Improvement and Figure Completion.

The present scale correlated .74 with the scale (N = 97).

Further, there is some evidence regarding the face validity and construct validity of the scale, as indicated in the test manual. The use of Guilford's model of creativity measures is adduced as evidence of the scales' validity. The selection of item-types which discriminate between the 'high-creative' and 'low-creative' groups (High and low identified on the basis of total scores in the test itself) is provided as additional evidence of the test's validity.

The reliability of the present tool has been calculated by the present investigator using the test-retest method. It was calculated by administering the test on a

group of 40 secondary school subjects (students belong to Standards VIII, IX and X), on two occasions, separated by an interval of roughly one month. The scores obtained by the subjects on the two testings were correlated using product-moment 'r' and a coefficient of .77 was obtained.

The available evidence provided by the test manual and the results of the independent studies conducted by the present investigator both show that this tool is a reasonably valid and reliable measure of creative thinking ability as applied to secondary school pupils of Kerala.

4.3 PERSONALITY MEASURES

The present investigation mainly consists in factor analysing a group of personality traits for two extreme group of creative thinkers within the high-intelligence group viz., 'HI-HC' and 'HI-LO'. The different personality measures used for the present investigation have been derived from the following standardized scales: (1) Kerala University Personality Scale 13 (2) Kerala University General Anxiety Scale 14 and (3) Kerala University Test Anxiety Scale. 15 A brief description of these scales is attempted below:

(1) KERALA UNIVERSITY PERSONALITY SCALE

The Kerala University Personality Scale, modelled after the California Test of Personality, is organised around the concept of life-adjustment as a balance between 'personal' and 'social' adjustment. 'This broad two-fold division is

consistent with a frequent practice of classifying adjustment difficulties into 'personality' problems (personal adjustment) and 'conduct' problems (Social adjustment). The battery, as a whole, may be considered to be a measure of socio-personal adjustment.

This scale is a popular measure of personality in Malayalam, standardized for use with secondary school population in Kerala. The scale consists of twelve sub-tests divided into two major areas of six each in the following way: (i) The Personal Adjustment Scale consisting of sub-tests 1 to 6, namely (1) Self Reliance (2) Sense of Personal Worth (3) Sense of Personal Freedom (4) Feeling of Belonging (5) Withdrawing Tendencies (Freedom from), and (6) Nervous Symptoms (Freedom from).

(ii) The Social Adjustment Scale consisting of sub-tests 7 to 12, namely (7) Social Standards, (8) Social Skills, (9) Anti-social Tendencies (Freedom from), (10) Family Relations, (11) School Relations and (12) Community Relations.

The test battery is meant for the secondary school pupils of Kerala, that is for students attending Standards VIII, IX and X. Each sub-test consists of 15 items which are in the form of simple questions. The subject has to mark either 'yes' or 'No' for each item in the space provided in the score sheet. There is no time limit and the subject is expected to answer all items in the test battery.

DETAILS OF THE SUB-SCALES

(i) **Self-Reliance**

The inclusion of this sub-scale is justified on the ground that those who depend on themselves in various situations are generally responsible and emotionally stable. Self-reliance forms a part of personal adjustment because self-reliant persons are confident of their dealings with others and their personal problems are solved by themselves. Most of the known adjustment inventories make use of measures of self-reliance, as a factor that contributes to general adjustment.

Examples of items in this sub-test are:

1. Do you usually complete the jobs that you undertake?
2. Do you seek the help of more mature boys in the class to deal with teachers who are rude to you?

(ii) **Sense of Personal Worth**

This sub-scale finds its place in an adjustment scale because an individual's assessment of himself has to be made in a social context (against others in his group). The person having a sense of personal worth feels that he is well regarded by others, and hence feels capable and confident. The item, inspite of its personal label, has definitely a social reference. Representative items of this sub-test are given below:

1. Do you think that your classmates like to have you in the class?
(2) Do you feel that your parents and teachers have a low estimate of your abilities?

(iii) Sense of Personal Freedom

'Sense of Personal Freedom' is accepted to be a component of personal adjustment. Children, especially in their adolescent age, want some freedom like freedom to choose friends, to have some money to be spent etc. The thwarting of these wishes lead to frustration and consequent maladjustment. 'An individual enjoys a sense of freedom when he is permitted to have a reasonable share in setting the general politics that shall govern his life'.

Examples of items in this category are:

(1) Do you think that older people in your family often blame you for trivial mistakes that you make?

(2) Do you feel that others interfere too much in your personal matters? And make life difficult for you?

(iv) Feeling of Belonging

The extent to which a person is accepted by others is considered to be an aspect of personal adjustment. Researchers prove that social acceptance is a crucial factor for healthy mental development. When an individual has a feeling of belonging, his need for love and recognition are satisfied. Only then can he enjoy cordial relationship with others in general. A person who is not accepted by others

in his group is definitely exhibiting behaviour symptoms which are not liked by others. Two typical items in this subtest are:

(1) Do you find it difficult to make friends with children who are newly admitted to your class?
(2) Have you felt that your classmates have not understood your worth?

(v) **Withdrawing Tendencies (Freedom from)**

Tendency to withdraw (mentally removed from others) is also an accepted manifestation of lack of personal adjustment. It is often wrongly assumed that only those who rebel are maladjusted. Serious forms of maladjustment are seen in pupils who are extremely quiet. Causes like frustration of needs or inferiority complex lead to withdrawing tendencies. Such students find enjoyment in fantasy and day-dreaming. This type of mental withdrawal prevent such students from mingling with others. Examples of items in this subtest are:

(1) Do you feel that you are often faced with more problems than other boys in your class?
(2) When the teacher is giving his lessons, have you felt the need to think about more pressing problems of your own?

(vi) **Nervous Symptoms (Freedom from)**

Manifestation of nervous symptoms is considered to be a clear evidence of the lack of personal adjustment. This is a comparatively more common form of maladjustment seen in classroom situations and it often affects the performance of
students. This type of maladjustment is depicted in various physical symptoms like frequent sneezing, nailbiting, frequent eye-strain or headache, tendency to be chronically tired etc. Items in this subtest include items like the following:

(1) Are you often unable to do things properly because of frequent headaches and eye strain?
(2) Do you easily get fatigued when you have important work to be done?

(vii) Social Standards

An understanding and acceptance of the standards set by society assumed to provide an index of one's social adjustment. The individual who recognizes desirable social standards is the one who appreciates the necessity to subordinate certain desires to the needs of the group.18 These standards may vary from culture to culture, and they assume a deciding role in the individual's behaviour and in his social adjustment. Examples of items in this sub-test are:

(1) Do you think that it is always necessary to be courteous to those whom you do not like?
(2) Do you get angry with other boys of your age when they try to make fun of elders?

(viii) Social Skills

An individual who is adjusted to his group definitely values and accepts the skills demanded by the group. Hence special skills form an important component of social adjustment. This component is therefore justified on the assumption

18. Ibid., p.3.
that an individual needs certain skills which enable him to put his knowledge of social skills (discussed earlier) effectively into practice. Observation of overt behaviour can also be used to assess the social skills, which vary with age, sex, occupation, social status etc. Representative items of this scale are:

(1) Do you find it difficult to congratulate others like you when they succeed in important things?

(2) Have you felt some uneasiness when you have to address other students in your class because all of them are watching you closely?

(ix) Anti-social Tendencies (Freedom from)

When a subject manifests anti-social tendencies, it is an unmistakable symptom of lack of social adjustment.

This form of maladjustment could often be traced to personal maladjustment also. The most obvious form of maladjustment of this kind is the tendency to question and flout things accepted by society as a whole. The anti-social individual finds satisfaction in his deeds because they are calculated to be disturbing and unfair to others. Examples of items in this sub-test are:

(1) Are you often faced with situations where lying is the easiest way to escape from your difficulties?

(2) Do you wish to annoy others when they do not prepared to listen to your arguments?

(x) Family relations

An important component of social adjustment is the
way one acts within his family. Family is the principal agent that moulds the behaviour patterns of individuals. As such, family relations have a very crucial role in the adjustment process. Satisfaction of the need for love and security and the consequent emergence of self respect depend greatly upon good family relations. Parental control and reaction to parental control, parent sibling relationships etc. are potent factors in the social adjustment of students. Representative items in this subtest are:

(1) Have you felt that your people at home behave in such a way that you have to quarrel with them?

(2) Do you think that your parents always point out your faults without caring for the good things you do?

(xi) School relations

Adjustment within the school is definitely a manifestation of the degree of one's social adjustment. School comes next to family in its influence on behaviour. It is in the school that the child learns the first lessons in group life and cooperation. It is this type of learning that paves the way to satisfactory social adjustment. The student who has satisfactory social relations feels that he is loved by teachers and friends. He finds the school work adapted to his level of ability and interest. Two typical items of this sub-test are:

(1) Have you felt that many of the subjects that you have to learn in school are very difficult?

(2) Do you feel that teachers behave more harshly to you than is needed?
(xii) Community Relations

Social adjustment is reflected in one's relation with others in his community. Good adjustment with the community depends much on factors like learning, maturity, social status, occupation etc. Those with good community relations tend to mingle freely and happily with their neighbours. They show tolerance to strangers and are generally respectful of laws and regulations. Examples of items in this sub tests are:

(1) Do you think that you are friendly with your neighbours?

(2) Would you say that your neighbours consider you as one in their family?

The Malayalam version of the 'Kerala University Personality Scale' is presented as Appendix VII.

SCORING PROCEDURE

In each item of the sub-tests, the subject is expected to express his answer in 'Yes' or 'No' responses, in a separate score sheet provided. In certain items the correct answer is an 'Yes' response while in some other items, the correct answer is a 'No' response. However, a score of one is given for each correct response. The total score in each sub-test gives the score in that sub-test. The scoring key of the Kerala University Personality Scale is presented as Appendix VIII.
VALIDITY AND RELIABILITY OF THE SCALE

Evidence regarding the validity of the test is available in the test manual and in a number of other independent studies. The present test is a standardized test of personality constructed on the theoretical model of the California Test of Personality. Besides following the theoretical model of this well-known test, this has been developed using highly sophisticated construction procedures as explained in the test manual. A more detailed study, to examine the factorial validity of this test, was conducted by Rama Devi. This study showed that the test battery is basically a measure of a single factor 'socio-personal' adjustment of personality. On the basis of these evidences, the scale may be taken to be a reasonably valid measure of the traits in question.

The test constructors quote the rational equivalence coefficients as evidence of the reliability of the total test and sub-tests. The present investigator worked out the reliability coefficients of the separate sub-tests and the whole test battery by the test-retest method before selecting the test for the purpose of the study. It was calculated by administering the test on a group of 96 secondary school subjects (students belong to Standards VIII, IX and X), on two occasions, separated by an interval of roughly one month. The scores obtained by the subjects on the two testings were correlated using product-moment 'r' and the result is reported below:

TABLE XIII  RELIABILITY COEFFICIENTS OF THE 12 SUB-TESTS AND THE WHOLE TEST OF THE PERSONALITY SCALE

<table>
<thead>
<tr>
<th>Test</th>
<th>Reliability Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Self-Reliance</td>
<td>.76</td>
</tr>
<tr>
<td>2. Sense of Personal Worth</td>
<td>.76</td>
</tr>
<tr>
<td>3. Sense of Personal Freedom</td>
<td>.72</td>
</tr>
<tr>
<td>4. Feeling of Belonging</td>
<td>.83</td>
</tr>
<tr>
<td>5. Withdrawing Tendencies (Freedom from)</td>
<td>.80</td>
</tr>
<tr>
<td>6. Nervous Symptoms (Freedom from)</td>
<td>.79</td>
</tr>
<tr>
<td>7. Social Standards</td>
<td>.75</td>
</tr>
<tr>
<td>8. Social skills</td>
<td>.71</td>
</tr>
<tr>
<td>9. Anti-social Tendencies (freedom from)</td>
<td>.77</td>
</tr>
<tr>
<td>10. Family Relations</td>
<td>.78</td>
</tr>
<tr>
<td>11. School Relations</td>
<td>.81</td>
</tr>
<tr>
<td>12. Community Relations</td>
<td>.82</td>
</tr>
<tr>
<td>13. Whole Test</td>
<td>.79</td>
</tr>
</tbody>
</table>

On the basis of the available evidence provided by the test manual and the independent studies reported, it may be concluded that the different sub-tests are reliable measures of personality traits.

2. KERALA UNIVERSITY GENERAL ANXIETY SCALE

'General Anxiety' as measured by the Kerala University General Anxiety Scale is considered as the 13th personality trait in the present study. Research evidences shows that
anxiety is a dominant factor which constitute the personality of the individual. The Kerala University General Anxiety Scale \(^{20}\) consists of 30 items in the form of simple questions. The subjects were expected to answer by making a 'Yes' or 'No' response on the score sheet provided. A score of one is given for each 'Yes' response while zero score is given for a 'No' response. No time limit is imposed on the test. Examples of items in this test are given below:

(1) Do you often get perturbed because you think you will not able to complete some important work?

(2) Are you afraid of going out in the dark?

The Malayalam version of the Kerala University General Anxiety Scale is presented as Appendix IX.

VALIDITY AND RELIABILITY OF THE GENERAL ANXIETY SCALE

This test has been modelled on the basis of the well known IPAT Anxiety Scale. Evidence regarding the scale's validity is provided in terms of the theoretical model implied in the original. Other evidence is provided by an independent study by Mathew \(^{21}\) - the negative correlation that the scores on this test has with achievement \((r = -.188)\) and intelligence \((r = -.204)\) for a sample of 727. The same study shows that this test correlates positively with test anxiety \((r = .605)\).

\(^{20}\) A.S. Nair, op.cit.

The reliability of the test has been worked out in another study by Samuel. The study showed that the test-retest reliability is +0.78 whereas the split-half reliability is +0.82. Thus the available evidences show that this test is also a reasonably valid and reliable measure of 'General Anxiety' of Secondary School Pupils of Kerala.

3. KERALA UNIVERSITY TEST ANXIETY SCALE

Test anxiety, as measured by the Kerala University Test Anxiety Scale, is the 14th personality trait. The Kerala University Test Anxiety Scale is intended to measure this special form of anxiety (i.e., test anxiety). This is a standardized scale in Malayalam developed for use with Secondary School students of Kerala.

This scale consists of 18 simple questions to which subjects have to answer either 'Yes' or 'No'. A score of one is given for each 'positive' response while zero score is given for 'negative' responses. In answering these questions, no time limit is prescribed. Examples of items in this test are given below:

(1) Have you worried yourself about the possibility of your teacher giving you low marks even when you have given the correct answer?

(2) When a class test is over, do you get uneasy over the thought that you have not been able to answer the way you wanted to?

23. A.S. Nair, op.cit.
The Malayalam Version of the Kerala University Test Anxiety Scale is given as Appendix X.

VALIDITY AND RELIABILITY OF THE TEST ANXIETY SCALE

This test has also been developed on the basis of the well-known I.P.A.T. Anxiety scale. Evidence regarding the scale's validity is provided in terms of the theoretical model implied in the development of the scale. Other evidence is provided by an independent study conducted by Mathew - the negative correlation that the scores on this test with achievement \( r = -0.288 \) and intelligence \( r = -0.288 \) for a sample of 727 secondary school pupils. The same study also reveals that this test correlates positively with general anxiety \( r = 0.605 \).

Since there was no special evidence regarding the reliability of this test, the present investigator himself worked out the reliability coefficient of this test by the test-retest method. This has been done by administering the test on a group of 96 secondary school subjects (pupils belonging to standards VIII, IX and X), on two occasions, separated by nearly one month. The scores obtained on the two testings were correlated using product-moment 'r' and a coefficient of 0.79 was obtained. Thus the available evidence (and the evidence obtained by the investigator himself) shows that this is a valid and reliable measure of Test Anxiety as applied to secondary school subjects.

EXPERIMENTAL VARIABLES

The different personality tests yielded the following fourteen experimental variables:

(i) Self-Reliance
(ii) Sense of Personal Worth
(iii) Sense of Personal Freedom
(iv) Feeling of Belonging
(v) Withdrawing Tendencies (Freedom from)
(vi) Nervous Symptoms (Freedom from)
(vii) Social Standards
(viii) Social Skills
(ix) Anti-social Tendencies (Freedom from)
(x) Family Relations
(xi) School Relations
(xii) Community Relations
(xiii) General Anxiety
(xiv) Test Anxiety.

ADMINISTRATION OF THE TESTS

After the preliminary planning concerning the sample, the heads of the selected schools were contacted first through letters and then personally by the investigator. Time schedule for administering the test and other details were fixed in consultation with the school authorities. The convenience of the concerned schools were duly considered. The investigator himself administered the tests. But he obtained the help of teachers in the concerned schools wherever necessary. The two intelligence measures viz., the Kerala University Verbal Group Test of Intelligence and the Kerala Non-Verbal Group Test of Intelligence were administered, following the instructions provided in the respective test manuals. These two tests were administered towards the beginn-
ing of the academic year 1975-76. The preliminary sample of roughly 5,000 were covered by testing 48 schools. On the basis of the scores obtained in these two tests, the high-intelligence subjects were identified as explained earlier and their schools located.

The investigator again for the second time (towards the middle of the academic year 1975-76) contacted the heads of the concerned schools through personal letter and gave them the list of pupils on whom the investigator proposed to conduct the creativity tests. The number of such subjects were found to vary from school to school, the numbers ranging from roughly 5 to 28. Time schedule and other details for administering the tests were decided according to the convenience of the concerned school authorities. The investigator undertook the administration of the Kerala University Test of Creative Thinking. The assistance of teachers was not obtained in view of the complex and specialized nature of the tests. The instructions provided in the test manual were carefully followed.

With a view of avoiding a third time visit in these schools and to save time, the personality tests which are intended for factor analysis were also administered to these high intelligence subjects along with the creativity test.