CHAPTER VII

ANALYSIS AND INTERPRETATION OF DATA

Having scored the tests and collected the data, the next step was to analyse the data in order to find whether reading ability is a unitary trait, or whether it gets differentiated into independent traits as pupils grow older. However, before commencing the procedure of analysis, arranging and systematising the data was essential. This had to be done by following a method or methods by which the data could be rendered meaningful. To some extent, the hypotheses that were formulated for the investigation also influenced it.

To secure measures of reading ability of the Public school Girl students of Delhi, a battery of fifteen reading ability tests was administered to two hundred students of the ninth grade and two hundred students of the eleventh grade drawn from different Public schools of Delhi. The same battery of tests was administered to both the classes. After discarding the answer sheets of those students who did not appear in all the fifteen tests or who did not respond to more than sixty percent of items in one test or the other, the investigator chose 190 answer sheets of the ninth standard and 156 answer sheets of the eleventh standard students.

In order to test the hypotheses formulated for the present study, viz., (1) that reading ability is not a unitary trait; but it has different facets and (2) that differentiation of abilities takes place as children, grow
older, the investigator adopted the technique of factor analysis.

7.1 Factor Analysis of the Fifteen Variables of the Reading Ability Test Battery.

Factor analysis is one of the most significant seminal methods of multivariate analysis. According to Anastasi:

"In the process of factor analysis the number of variables or categories in terms of which each individual's performance can be described is reduced from the number of original tests to a relatively small number of factors or common traits."

(Anastasi, 1961 P. 147)

Again, as Comrey has remarked:

One common objective of factor analysis is to provide a relatively small number of factor constructs, that will serve as satisfactory substitute for a large number of variables. These factor constructs themselves are variables that may prove to be more useful than the original variables from which they are derived."

(Comrey, 1973, P.6)

For the present study, the factor analysis technique was resorted to for identifying whether the fifteen variables of the Reading Ability Test Battery were really independent variables and different from one another or whether they represented a single ability or a relatively lesser number of abilities. It was for this that the assumption underlying factor analysis methods was
accepted, i.e., a battery of intercorrelated variables has common factors running through it and those factors could be identified through factor analysis. The significant and high loadings on a set of tests and very low and none too significant loadings on others would help to understand how much variance in each one of the tests in that set can be explained by that common factor and conversely, the common nature of intellectual operations involved in performing the tasks set in those tests would help to identify and label the common factor.

7.2 Various Steps in Factor Analysis

The following are the major steps that are followed in factor analysis:

a) Selecting the variables and securing measures of these from fair sized samples.

b) Computing the matrix of correlations among the variables.

c) Extracting the unrotated factors.

d) Rotating the factors and
e) Interpreting the rotated factor matrix.

The factor analysis proper begins with a matrix of correlation coefficients of data variables that are being studied. The coefficient of correlations helps in determining the degree of relationship between two variables. However, to compute linear correlation between two variables, it is necessary to establish that the variables are normally distributed. Whenever the number of variables is large, Guilford et al. (1952) have suggested that the raw scores can be transformed into normalised
T-Scores in order to ensure the normality of distribution. For the present investigation too, the raw scores were first transformed into T-Scores.

7.3 Computation of the T-Score

T-Scores are normalised standard scores converted into a distribution with a mean of 50 and a standard deviation of 10. The T-scale ranges from mean $\pm 50$ i.e., from zero to one hundred. But much of data obtained (99%) happens to be within mean $\pm 2.58\sigma$ i.e. $50 \pm 25.8$ or from around 24 to 76.

Converting the raw score into T-score is by finding out the percentile rank of each score. This is done in the following manner.

After administering the tests to the students, the answer sheets are scored and tabulated. From this table the distribution of the total scores is found out. Then the scores are scaled by finding the number of subjects achieving each score (frequencies). The next step is to find out the cumulative frequencies from the low to the high end of the frequency distribution. The next important step is to find out the number of subjects who fall below each score plus one half of those who get the given score. The reason why one half of the frequency on a given score is added to the frequency falling below that score is that each score is an interval, not a point on the scale. For example, a score of four (4.0) covers the interval 3.5 to 4.5 with a midpoint at 4. So half of its frequencies and the cumulative frequency below it would give the total frequencies below the midpoint of score four.
The next step is to express these as percents of the total number of frequencies. In other words, the percentile rank of each score is the percent of frequencies below a given score mid point.

The percentile rank can be turned into T-Scores by finding 'Z' value from the normal probability curve tables below which lie the given percent of cases and then multiplying this 'Z' value by 10 and adding it to 50 i.e.,

\[ T = 10z + 50 \]

According to Garret:

"T-Scores have general applicability, a convenient unit and they cover a wide range of talent. Besides these advantages T-Scores from different tests are comparable and have the same meaning since reference is always to a standard scale of 100 units based upon the normal probability curve. T-scaling forces normality upon the scores of a frequency distribution."

(Garret 1966. P.318)

The raw scores of all the fifteen tests were thus transformed into T-scores in case of both the groups. The raw scores of standard IX and standard XI and their corresponding T-scores are given in Appendices F1 and F2 and G1 and G2 respectively.

7.4 Computation of Inter correlation matrices

T-score of fifteen Reading Ability Tests for the ninth and eleventh standards were then fed into the computer. To discern the relationship amongst these different variables, intercorrelation among them were gleaned from the intercorrelation matrix. The
computations were made on 1033/REYAD computer system installed in Council for Social Development, Lodhi Road, New Delhi using Statistical Package for Social Science (SPSS) Programme formulated by Nie et.al (1975).

In the present study, the two grades ninth and eleventh were marked as Group I and Group II respectively. Appendices H and I show the intercorrelations among the fifteen variables in case of these groups. All corelations were positive and significant i.e., they belonged to a positive manifold. Hence factor analysis of the intercorrelation matrix could provide meaningful factors to explain the variance of these tests.

7.5 Factor Extraction

Comrey has remarked:

"With a large number of variables and many substantial correlations it becomes very difficult to keep in mind or even to contemplate all the intricacies of the various relationships. Factor analysis provides a way of thinking about these relationships by positing the existence of underlying 'factors' or 'factor constructs' that account for the values appearing in the matrix of intercorrelations among these variables."

(Comrey, 1973, p.6)

Hence, the next step in factor analysis was to determine how many factor constructs were needed to account for the pattern of values found in the correlation matrix. This was done through a process called factor extraction. In the present study factor extraction with a criterion that factor extraction would be stopped as and when eigen value drops below 1.00, revealed the presence of only one
factor in the case of Group I. Appendix H shows factor matrix extraction of Group I.

The following table 7.01 shows the principal factor, eigen value, percentage of variance and cumulative percentage of variance in case of Group I.

**Table 7.01 :** Showing Eigen Values, Percentage of Variance and Cumulative Percentage of Variance in case of Group I.

<table>
<thead>
<tr>
<th>Group</th>
<th>Factors</th>
<th>Eigen Values</th>
<th>PCT of Variance</th>
<th>Cum PCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>I</td>
<td>9.514</td>
<td>63.4</td>
<td>63.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.775</td>
<td>5.2</td>
<td>68.6</td>
</tr>
</tbody>
</table>

A perusal of the table above revealed that in the case of Group I as only one eigen value was greater than 1.00, only one principal factor would suffice to explain the variance in the fifteen reading ability tests.

In the case of Group II, however, with the same eigen value criterion, two factors emerged on factor extraction. The following table 7.02 shows the principal factors, eigen values, percentage of variance and cumulative percentage of variance in case of Group II.

**Table 7.02 :** Showing Eigen Values, Percentage of Variance and Cumulative Percentage of Variance in case of Group II.

<table>
<thead>
<tr>
<th>Group</th>
<th>Factors</th>
<th>Eigen Values</th>
<th>PCT of Variance</th>
<th>Cum PCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>I</td>
<td>8.012</td>
<td>53.4</td>
<td>53.4</td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>1.329</td>
<td>8.9</td>
<td>62.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.902</td>
<td>6.0</td>
<td>68.3</td>
</tr>
</tbody>
</table>
A perusal of the table above revealed that in the case of Group II, as there were two eigen values greater than 1.00 two principal factors emerged and these two factors would suffice to explain the variance of those tests which have significant and high loadings in the first factor and the rest of the tests which again have significant and high loadings in the second factor.

As revealed in Appendix I in the case of Group II all variables on Factor I had high positive loadings and Factor II had negative loadings in five variables and low positive loadings in ten variables. Thus the table presented some intriguing results and it became difficult to interpret the factors. Therefore, it became necessary to rotate factor loadings to give meaningfulness to the patterning of variables.

7.6 Significance of Rotation

Several methods for analysing a set of variables into common factors have been identified. Specified set of rules have been laid down governing how rotations have to be carried out to transform the unrotated factor matrix into interpretable factor constructs. Several rotational methods published in the fifties proved to be rather similar to each other and these similar methods collectively were referred the Quartimax methods. The essential idea underlying this approach was to rotate in such a way that each variable would have a major loading in one and only one factor, i.e., each variable would appear to be a pure factor measure. In practice it was not always possible to obtain such an idealised solution. (cf. Comrey, 1973. P.173)
The Kaiser Varimax method (Kaiser, 1958) has become the most popular rational procedure in use today. It happens to be a method that gives excellent results in most of the situations. The Varimax method does not suffer from the tendency to give a general factor as the Quartimax methods do.

According to Comrey:

"The Quartimax method attempts to maximise the variance of squared factor loadings by rows. The Varimax method by contrast maximises the variance of the squared factor loadings by columns. Thus on any given factor a pattern is desired such that there are some high loadings and lots of low loadings with few intermediate sized loadings. This type of solution offers easy interpretability because variables with high loadings are similar to the factor in character, whereas variables with low loadings are not. A variable with an intermediate loading is of little use in telling what the factor is or is not like. Varimax rotation then tends to push high loadings higher and low loadings lower to the extent that this is possible within the constraints maintained by an orthogonal reference frame."

(Comrey, 1973 P. 173)

Thus it becomes clear that for a given matrix of correlation all the factor methods arbitrarily locate the reference axes in different positions. In order to move the axes from the arbitrary location determined by the method of extraction to some position useful for interpretation of these factors, and for comparison with other studies, the axes are rotated.
Thus, according to Frutcher:

"A major goal of rotation is to obtain meaningful factors that are as consistent (or invariant) as possible from analysis to analysis. The proper location of the reference frame depends upon the purpose and theoretical approach of the factor analyst."

(Frutcher, 1965 P.106)

Thus, the rotated and unrotated factor matrices are mathematically equivalent in the sense that they both account equally well for the original correlation coefficients from which they are derived. But the rotated factor constructs are often much more useful for purposes of interpretation than the unrotated factor constructs. Moreover the loadings on rotated factor constructs are more stable, dependable and useful than those represented by unrotated factor loadings as these latter depend heavily on the number of variables. The deletion of one variable may change the relative loadings on the unrotated factors.

In the present study, the principal factors in case of Group II were rotated according to the varimax criterion using the same SPSS programme at the same computer. After the varimax rotation two factors were extracted in factor analysis in the case of Group II.

7.7 Interpretation of Factors

After the rotated factor loadings have been obtained, the next important step is to identify the content and nature of the factors. This step calls for psychological insight rather than statistical training. To learn the nature of a particular factor, one has to examine
the tests having high loadings on that factor and try to
discover what psychological process they have in common.

There will be several data variables with high
loadings on one factor as well as a number of data
variables that will be essentially unrelated to the factor.
If a factor is not overdetermined, it may appear only
weakly and with a small number of defining data variables.
This situation makes the factor difficult to position and
hard to identify.

According to Comrey:

"Three good relatively factor-pure
markers would constitute an absolute
minimum number of variables to define a
factor in the analysis. The more
variables there are to define a factor,
the more clearly will it be established
in the analysis and the easier it will be
to locate it in the rotation. The total
number of data variables included in a
factor analysis, then, should be at least
five or six times as great as the number
of factors expected to emerge."

(Comrey, 1973. P.191)

To determine, whether a factor is overdetermined
in the analysis, only relatively factor-pure data variables
are counted on. A pure-factor data variable has a major
loading in only one factor. It is to be contrasted with a
complex data variable that has major loadings in more than
one factor. These complex data variables are not very
useful in determining the proper positioning of factors.
They have moderate loadings on several factors; hence, they
do not help in identifying the nature of the factors on
which they have their major loadings. The Varimax method
tries to avoid this type of loading since it is not easily interpreted. The several 'marker' variables for each factor should be as factor-pure as possible.

As Comrey has stated:

"The more factor-pure a variable is that defines a factor, the easier it is to make inferences regarding the nature of the factor."

(Comrey, 1973 p.224)

Another question that arises is that of how high the correlation between a data variable and a factor must be, before it can be regarded as 'significant' for interpretive purposes. In fact, there is practically no clear-cut and precise statistical directive that can establish the level of significance of a rotated factor loading. A crude index of the usability of a given data variable for interpretive purposes is the square of the correlation between the factor and the data variable. If this value is high enough, it indicates a total overlap of the data variable's true variance with the factor. If this value is very low, the data variable is too unlike the factor to be considered in the factor interpretation.

A commonly used cut off level for orthogonal factor loadings is 0.30. i.e., no variable with a factor loading below 0.30 is listed among those data variables defining the factor. A squared value (.30)\(^2\) gives 0.09 which indicates that a data variable correlating with the factor less than .30 has less than 10 per cent of its variance in common with the factor. Some investigators have been known to list loadings less than .30 in interpreting
factors, but in the orthogonal case where such loadings are interpretable as correlations, such values seem excessively low.

Comrey has rated factor-loadings in the following manner which would provide some guidance to researchers for the purpose of identification and interpretation of factors.

Table 7.03: Showing scale of Variable-Factor Correlation

<table>
<thead>
<tr>
<th>Orthogonal factor-loading</th>
<th>Percentage of Variance</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>.71</td>
<td>50</td>
<td>Excellent</td>
</tr>
<tr>
<td>.63</td>
<td>40</td>
<td>Very Good</td>
</tr>
<tr>
<td>.55</td>
<td>30</td>
<td>Good</td>
</tr>
<tr>
<td>.45</td>
<td>20</td>
<td>Fair</td>
</tr>
<tr>
<td>.32</td>
<td>10</td>
<td>Poor</td>
</tr>
</tbody>
</table>

(Comrey, 1973. p. 226)

Eventhough loading of .30 and above have commonly been listed among those high enough to provide some interpretive value, such loadings certainly cannot be relied upon to provide a very good basis for factor interpretation.

As Comrey has stated:

"Common sense dictates that factor interpretation based on a few variables with only "poor" to "fair" ratings must be made very cautiously and with every expectation that substantial revisions may be necessary in the future. If several data variables are available with loadings in the "very good" to "excellent"
category, the investigator can afford to be somewhat more definite in what he says about the factor.

(Comrey, 1973, p.226)

In the present study in the case of Group II some variables revealed high loadings and some others low and a few moderate. Now it had to be identified what the tests with high loadings on a factor had in common that was present to a lesser degree in tests with moderate loadings and absent from tests with very low and near zero loadings.

A perusal of Table 7.05 and 7.06 would reveal rotated factors with their loadings in case of Group II. By inspecting the content of the variables on both the factors, it was possible to get some idea about the nature of the underlying factor constructs. Further, the insight obtained from authorities like Comrey and Frutcher helped the investigator in the interpretation of factors to some extent.

7.7.1 Factor Analysis of Group I Data

In the case of Group I only one eigen value was greater than 1.00. Therefore, only one principal factor was identifiable in the case of Group I.

(See Table 7.01)

The following table 7.04 shows factor loadings in the fifteen variables in case of Group I.
Table 7.04: Showing Factor Loadings in the Fifteen variables in case of Group I.

<table>
<thead>
<tr>
<th>Sl. No. of Variables</th>
<th>Names of Tests</th>
<th>Factor Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.</td>
<td>Reading to Note Details. (Comprehension Test VII) **</td>
<td>0.668</td>
</tr>
<tr>
<td>14.</td>
<td>Reading for General Significance (Comprehension Test VI) **</td>
<td>0.844</td>
</tr>
<tr>
<td>13.</td>
<td>Reading for Inference (Comprehension Test V) **</td>
<td>0.792</td>
</tr>
<tr>
<td>7.</td>
<td>Recognition of the Meaning of a Phrasal Verb. (Vocabulary Test VII) **</td>
<td>0.748</td>
</tr>
<tr>
<td>9.</td>
<td>Recognition of the Paraphrase of a Key word. (Comprehension Test I) **</td>
<td>0.675</td>
</tr>
<tr>
<td>5.</td>
<td>Recognition of Words in Context (Vocabulary Test V) **</td>
<td>0.643</td>
</tr>
<tr>
<td>4.</td>
<td>Identification of a word to Replace a Phrase or Idea (Vocabulary Test IV) **</td>
<td>0.636</td>
</tr>
<tr>
<td>6.</td>
<td>Recognition of the Key word for a Proverb. (Vocabulary Test VI) **</td>
<td>0.630</td>
</tr>
<tr>
<td>11.</td>
<td>Recognition of Sentence Meaning (Comprehension Test III) **</td>
<td>0.616</td>
</tr>
<tr>
<td>8.</td>
<td>Recognition of Diction and Usage. (Vocabulary Test VIII) **</td>
<td>0.602</td>
</tr>
<tr>
<td>12.</td>
<td>Recognition of the Meaning of Proverbs. (Comprehension Test IV) **</td>
<td>0.600</td>
</tr>
</tbody>
</table>

contd..
Table 7.04 (contd.)

<table>
<thead>
<tr>
<th>Sl.No. Of variables</th>
<th>Names of Tests</th>
<th>Factor Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.</td>
<td>Recognition of Idiomatic Expressions (Comprehension Test II) **</td>
<td>0.546</td>
</tr>
<tr>
<td>1.</td>
<td>Recognition of Word Meaning. (Vocabulary Test I) **</td>
<td>0.509</td>
</tr>
<tr>
<td>2.</td>
<td>Synonyms. (Vocabulary Test II) **</td>
<td>0.468</td>
</tr>
<tr>
<td>3.</td>
<td>Antonyms. (Vocabulary Test III) **</td>
<td>0.333</td>
</tr>
</tbody>
</table>

** Marker (defining) Loadings.

The table revealed that all the fifteen variables emerged with 'excellent' to 'good' marker (defining) loadings on the same factor.

Comprehension Test VII (Reading to Note Details) emerged with an 'excellent' defining marker loading of 0.468. This test required the students to read a given passage and answer the questions based on that passage. Here is an example:

Example:

The invention of the wheel was put to great use by the potters. Now they could make pottery of regular shape and in less time. They made pottery of different types to suit their needs. They decorated their pottery with the pictures of flowers, leaves and geometrical designs.
(i) The wheel was useful for
   a. transportation.
   b. trains.
   c. potters.
   d. motors.

(ii) The wheel helped the potters in
   a. going from one place to another.
   b. making journey in less time.
   c. making better pottery in less time.
   d. making decorative pottery.

(iii) The pottery they made was
   a. decorative.
   b. simple.
   c. delicate.
   d. costly.

In order to pick out the correct alternative the examinee had to go through the passage carefully. Thus this test involved thorough comprehension of the extract before the testee could pick out the significant detail. (cf. Comprehension Test VII. B 7 Sub-test VII Appendix D).

Comprehension Test VI (Reading for General Significance) which had an excellent defining marker loading of 0.844 required the testees to exercise judgement in selecting relevant facts found in a passage, and arriving at generalisations and conclusions. Here is an example.
Example:

After the whole day's work, when Ramu came back home, it was noon. The sun was shining brightly. He took off his clothes and lay down under the tree. Ramu was

a. tired 

b. ill

c. lazy

d. worried

The passage tells about the physical condition of Ramu after a day's hardwork and the correct answer is 'a' 'tired.' In order to arrive at such a generalisation, the testee had to comprehend the general import of the extracts provided in this test.

(cf. Comprehension test VI B.6. Sub-test VI Appendix D)

Again, Comprehension test V (Reading for Inference) emerged with an excellent defining marker loading of 0.792. In this test, the testee had to read the given passage carefully and infer what might happen next, considering the context clues in the passage. It involved comprehending the sequence of events and grasping their implications for the future. Here also, the testee's comprehension ability was involved, as it would be clear from the following example.

Example:

Louis Pasteur was the world's leading scientist. He is most famous for devising the method named pasteurization after him, of preserving the purity of milk, wine and other liquids. There appeared many articles about his invention in all the leading magazines of the world.

a. Now there is a scarcity of milk, wine etc.
b. No one knows about the invention.
c. He unnecessarily wasted his time.
d. Now many people follow his method.

Here, the testee had to infer that, considering the popularity gained by the new method of 'Pasteurization', many people would follow this method. Hence, the correct choice is 'd'. Items like this required the testee to comprehend the context clues and make such inferences. (cf. Comprehension test V B.5 Sub-test V Appendix D)

Vocabulary Test VII (Recognition of the Meaning of a phrasal Verb) emerged with an excellent defining marker loading of 0.748 on this same factor. This test required the students to identify the word which would best give the meaning of the phrasal verb italicised in the given sentence. They were given four choices also for each item. Example:

I cannot put up with his insolence.

a. admit  b. support
c. tolerate  d. submit to

Here, the correct meaning of the phrasal verb 'put up with' is 'tolerate'. To select such correct meanings involved the testee's ability to deal with semantic units. (cf. Vocabulary Test VII A.7 Sub test VII Appendix D)

Comprehension test I (Recognition of the Paraphrase of a key word) which emerged with an excellent defining marker loading of 0.675 asked the testees to choose the paraphrase of the italicised word in a sentence.
They were also given four choices for each item.

Example:

Dr. Rao is a naturalist. He...........

a. is a lover of nature.
b. writes poems on nature.
c. studies plants, animals, insects, etc.
d. works for the 'protection' of nature.

Here the correct answer is 'c'. Items like this assessed the Comprehension of students of certain facts and their ability to express the meaning of a word in an alternate method.

cf. Comprehension test I. B.l. Sub test I Appendix D)

Vocabulary Test V (Recognition of Words in Context) emerged with an excellent defining marker loading of 0.643. This test required the testees to select from the choice of four words given one word which was the most nearly appropriate to the context of the sentence and fill up the blank space in the given sentence.

Example:

There was a sudden ___________ of violence in the city last week.

a. gush b. rush
c. upsurge d. explosion

Here, the correct choice is 'c' 'upsurge'. The testees were expected to know that in the context of a violence 'upsurge' is the most suitable word to be used.
Items like this tested the word knowledge of students. (cf. Vocabulary test V A.5. Sub. test V Appendix D)

Vocabulary Test IV (Identification of a word to Replace a phrase or Idea) with an excellent defining marker loading of 0.636 required the testees to select one word from the four choices given to substitute a given phrase or idea.
Example:

'Stealthily removing small quantities'

a. plundering b. pilfering
c. looting d. burglary

Here the correct answer is 'b' 'pilfering'. Items like this tested the Word Knowledge of the testees. (cf. Vocabulary test IV. A.4 Sub test IV Appendix D)

Vocabulary Test VI (Recognition of the Keyword for a Proverb) with an excellent defining marker loading of 0.636 required the testees to choose from the four words given, the word which best expressed the essence of a given proverb or quote.
Example:

Spare the rod and spoil the child.

a. patience b. pity
c. leniency d. tolerance

Here, the right choice is 'c' 'leniency', which conveys the essence of the saying. Items like this tested
the Word Knowledge of the testees.
(cf. Vocabulary Test VI. A.6 Sub test VI Appendix D).

Comprehension Test III (Recognition of sentence Meaning) which emerged with an excellent defining marker loading of 0.616 required the testees to choose the one most appropriate explanation of a given sentence. For each sentence four explanations were also given.

Example:

Wealth leads to greater wealth; but poverty leads to increased distress.

a. The wealthy becoming richer, keep the poor in distress.
b. Wealth and poverty go hand in hand.
c. Riches bring greater riches, whereas poverty results in greater affliction.
d. The wealthy and the poor suffer distress equally.

Here, the correct explanation of the given sentence is 'c'. In order to select such correct choices, the testees had to read and comprehend the sentences and the explanations carefully. Hence, the test involved comprehension.
(cf. Comprehension test III B.3. Sub test III Appendix D)

Vocabulary Test VIII (Recognition of Diction and usage) with an excellent defining marker loading of 0.602 required the testees to fill up the blank space in a given sentence with the appropriate usage or grammatical construction from the four choices given after each sentence.
Example:

Not so long ago, thirty miles ________ considered a good day's journey.

a. was   b. were
c. is     d. are

Here, the correct choice is 'a', 'was'. Here the testees were required to know that measurement of distances, though apparently plural in form, is treated as singular and takes a singular verb. Items like this tested their knowledge of diction and usage and their word knowledge.

(cf. Vocabulary test VIII. A.8 Sub test VIII Appendix D)

Comprehension Test IV (Recognition of the Meaning of Proverbs) emerged with an excellent defining marker loading of 0.606 asked the testees to select the correct statement from a choice of four statements, which would best explain the meaning of a proverb.

Example:

Where there is a will, there is a way.

a. There is always a right way to do something.
b. If you keep trying, you will succeed.
c. There is always a way for everything.
d. If one has determination, he will succeed.

Here the right answer is 'd'. A proverb test requires the testee to read and understand the inner meaning of a proverb which would invariably provide a moral
lesson. Hence, this test involved the comprehension of testees.
(cf. Comprehension Test IV, B.4. Sub test IV. Appendix D)

Comprehension Test II, (Recognition of Idiomatic Expressions) also emerged with an excellent defining marker loading of 0.545. It required the testees to choose the correct meaning of the idioms or metaphoric expressions in the given sentences. For each item, a choice of four answers was given.

Example:

He has *too many irons in the fire*.

a. is very hard working.
b. is engaged in too many activities.
c. has no concentration in his work.
d. is tired with overstrain.

Here, the correct meaning of the given idiom is 'b'-'is engaged in too many activities.' To get the correct meaning of the idioms and metaphors, the testee had to read the statements and think properly to go beyond the literal sense of the expression. Items like this involved comprehension.
(cf. Comprehension Test II B.2 Sub test II Appendix D)

Vocabulary Test I (Recognition of Word Meaning) emerged with an excellent defining marker loading of 0.504. This was a usual vocabulary test requiring the students to find out the correct meaning of the italicised word in a given sentence from the choice of four words given after each item.
Example:

The *verdict* was in his favour.

a. evidence  b. report  
c. judgement  d. statement

Here the correct meaning of the word 'verdict' is 'judgement.' Items like this one, assessed the students' word knowledge. (cf. Vocabulary Test I. A.1 Sub test I Appendix D).

Vocabulary Test II (Synonyms) with a very good marker loading of 0.468 required the testee to select the word which was most nearly the same in meaning as the original word. For each item they were given four words to choose from.

Example:

Fast  a. quick  b. hurry  
c. haste  d. speed

Items like this tested the word knowledge of the testees. (cf. Vocabulary Test II. A.2 Sub test II Appendix D)

Vocabulary Test III (Antonyms) emerged with a good loading of 0.333. This test required the testee to select the word which was most nearly opposite to the meaning of the original word. Each item was followed by a choice of four words.

Example:

Cruel  a. good  b. gentle  
c. kind  d. noble
Items like this also tested the word knowledge of the testees.
(cf. Vocabulary Test III, A.3 Sub-test III Appendix D).

Thus, it may be noticed that all the Comprehension tests and Vocabulary Tests emerged on this single factor with 'excellent' to 'good' factor loadings. Therefore, the variance in the fifteen tests could be accounted for by one factor and this factor may be named as Reading Ability Factor.

7.7.2 Conclusion

It was obvious that in the case of this group (Group I) reading ability did not emerge as a differentiated ability; rather, it emerged as a single, unitary trait. Thus, the first hypothesis of the present study, i.e., reading ability is not a unitary trait, but it has several facets, remained unsustained as far as Group I comprising the ninth grade girl students of the Public Schools, is concerned.

At this point it would be worthwhile to recall the findings of several research workers who conducted factor analysis studies of reading ability and came to the conclusion that reading ability is a unitary trait. Among them, the pioneers are Conant (1942), Thurstone (1946), Harris (1948) and McCullough (1957). A recent study in India by Grover (1990) on the reading ability of Indian Students in English deserves special mention. She administered a battery of six reading ability tests to five groups of ninth standard students of Central Schools and Government Schools of Delhi. Factor analysis of intercorrelation matrices gleaned from the data secured,
revealed only one factor for Group II. (Central School Girls) Group III (Government School Boys) and Group IV (2 Government School Girls. i.e., Delhi Cantt and R.K. Puram). The single factor that emerged in the case of Group II, III and IV was named as the Reading Ability Factor.

The result of the present research work done on the ninth grade public school students of Delhi was in consensus with the results of the research work done by the above-mentioned pioneers of the single-factor theory of reading ability. This was also evident when Grover's (1990) research findings with regard to her Groups II, III and IV of Central School and Government School ninth class students were juxtaposed and compared with the finding of the present study on the ninth class Public School students of Delhi. Thus, it could be posited that there is a consanguinity in the structure of the reading ability of ninth grade students of Delhi Schools.

7.7.3 Factor Analysis of Group II Data

Varimax rotation in case of Group II showed that two eigen values were above 1.00 and hence two principal factors emerged.

(See Appendix I)

Table 7.05 shows rotated factor loadings on Factor I. Following the rating pattern suggested by Comrey, only those tests which had loadings of more than .42 were listed among those data variables defining the factor especially because there were quite a number of tests having loadings in 'excellent' and 'good' category.
Factor I has been identified as Factor A for further discussion.

**Table 7.05 : Showing Tests High on Varimax Rotated Factor A (Group II)**

<table>
<thead>
<tr>
<th>Sl.No. of Variables</th>
<th>Names of Tests</th>
<th>Factor Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Recognition of the Meaning of Phrasal Verbs.</td>
<td>0.756</td>
</tr>
<tr>
<td>7.</td>
<td>(Vocabulary Test VII) **</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recognition of Words in Context.</td>
<td>0.737</td>
</tr>
<tr>
<td>5.</td>
<td>(Vocabulary Test V) **</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recognition of Idiomatic expressions.</td>
<td>0.676</td>
</tr>
<tr>
<td>10.</td>
<td>(Comprehension Test II) *</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recognition of a Word to Replace a Phrase or Idea.</td>
<td>0.667</td>
</tr>
<tr>
<td>4.</td>
<td>(Vocabulary Test IV) *</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Antonyms.</td>
<td>0.666</td>
</tr>
<tr>
<td>3.</td>
<td>(Vocabulary Test III) *</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recognition of Diction and usage.</td>
<td>0.664</td>
</tr>
<tr>
<td>8.</td>
<td>(Vocabulary Test VIII) *</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Synonyms.</td>
<td>0.655</td>
</tr>
<tr>
<td>2.</td>
<td>(Vocabulary Test II) *</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recognition of a Keyword for a proverb.</td>
<td>0.638</td>
</tr>
<tr>
<td>6.</td>
<td>(Vocabulary Test VI) *</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recognition of the Paraphrase for a Word.</td>
<td>0.600</td>
</tr>
<tr>
<td>9.</td>
<td>(Comprehension Test I) *</td>
<td></td>
</tr>
<tr>
<td>Sl.No. of Variables</td>
<td>Names of Tests</td>
<td>Factor Loadings</td>
</tr>
<tr>
<td>--------------------</td>
<td>----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>11.</td>
<td>Recognition of sentence Meaning. (Comprehension Test III) *</td>
<td>0.559</td>
</tr>
<tr>
<td>12.</td>
<td>Recognition of Meaning of proverbs. (Comprehension Test IV)</td>
<td>0.482</td>
</tr>
<tr>
<td>1.</td>
<td>Recognition of Word Meaning (Vocabulary Test I)</td>
<td>0.428</td>
</tr>
</tbody>
</table>

** Tests with defining marker loadings i.e., having their significant loadings only on this factor.

* Tests with marker loadings i.e., major significant loadings on this factor.

** Factor A Word Knowledge Factor

A perusal of table 7.05 above revealed that Vocabulary Test VII and V had excellent (defining) marker loadings on this factor. Vocabulary tests III, IV, VIII, I and VI too had very good marker loadings on this factor. However, Vocabulary test I had poor secondary loadings on this factor and good marker loadings on the second factor.

Vocabulary Test VII (Recognition of the Meaning of Phrasal Verbs) which had a (defining) marker loading of 0.756 on this factor, required the testee to identify the one most appropriate word from the given choices of four words which would best give the meaning of the phrasal verb.
given in italics in the sentences.

Example:

He has got through his examination.

a. passed  b. finished  
c. undergone  d. written

Here, the right word is 'passed'.

In order to select the right word, the testee should have knowledge of the meaning of such phrasal verbs which are used quite often in spoken and written English. This involved his ability to deal with semantic units.

(Cf. Vocabulary Test VII A.7 Sub-Test VII Appendix D)

Vocabulary Test V (Recognition of Words in context) which had a (defining) marker loading of 0.737 on this factor required the testee to fill up the blank space in a given sentence selecting one word which was most nearly appropriate to the context of the sentence.

Example:

The boy thanked the teacher______________.

a. extensively  b. profusely  
c. fully  d. generously

It may be noticed that the given distractors have more or less the same meaning when they are viewed separately. But in the context of the given sentence, the word 'profusely' is the most suitable one that goes with the word 'thanked'. To select such appropriate words according to the context students should have good command
of vocabulary. Therefore, this test involved the testees' ability for vocabulary.
(cf. Vocabulary Test V. A 5. Sub Test V Appendix D)

Vocabulary Test IV (Recognition of a Word to Replace a phrase or idea) which had a marker loading of 0.667 on this factor was meant to test the students' mastery of using apt words to express their ideas with brevity and clarity. Here, they were required to select from the given alternatives an appropriate word which would convey the meaning of a phrase or idea.

Example:

Beneficial use of money ________.

a. management  b. economy
b. savings  d. prudence

Here, 'economy' is the word which expresses the idea 'beneficial use of money'. This test also helped in testing the students' vocabulary ability.
(cf. Vocabulary Test IV A.4 Sub-test IV Appendix D)

In Vocabulary Test III (Antonyms) which had a marker loading of 0.666 on this factor, the testees were required to select the appropriate antonyms of the original words.

Example:

Foolish:

a. intelligent  b. brilliant
c. clever  d. wise
This test helped in assessing the students' knowledge of lexical items.
(cf. Vocabulary Test III A.3 Sub Test III Appendix D)

Vocabulary Test VIII (Recognition of Diction and Usage) which had a marker loading of 0.664 on this factor required the students to fill up the blank spaces in the given sentences with the correct words and usages chosen from the four alternatives given after each sentence. Example:

There were ____ people at the meeting this week than at the last one.
   a. less          b. fewer
   c. little        d. few

Here, the students were expected to know that 'fewer' is the word denoting number and comparative degree.

Items like this were meant to assess the students' awareness of diction and usage, which is also connected with their command of vocabulary.
(cf. Vocabulary Test VIII A.8 Sub Test VIII Appendix D)

Vocabulary Test II (Synonyms) which had a marker loading of 0.655 on this factor was a Synonymity Test. Here, the testees were expected to select from the given list of alternatives, the most suitable synonymous words. Example:

Wound:

   a. damage          b. destruction
   c. harm            d. injury

A synonymity test is a usual vocabulary test to
assess the students' word knowledge.
(cf. Vocabulary Test II A.2 Sub Test II Appendix D)

Vocabulary Test VI (Recognition of a Keyword for a Proverb) which had a marker loading of 0.638 on this factor asked the students to find out from the given four alternatives the word which conveyed the essence of some well-known proverbs and quotes.

Example:

A stitch in time saves nine.

a. convenience b. opportunity
c. timeliness d. emergency

Here, the given proverb refers to the importance of timely action. Hence the word 'timeliness' conveys the essence of the proverb. Such items as this in this test assess the word knowledge of children.
(cf. Vocabulary Test VI A.6 Sub Test VI Appendix D)

In Vocabulary Test I (Recognition of Word Meaning) which had a secondary loading of 0.428 on this factor students were required to identify the meaning of the italicised word in the given sentences. They were given four alternatives to choose from for each item.

Example:

He has a relapse of typhoid.

a. reversion b. recurrence
c. repetition d. regression
Here, 'recurrence' is the nearest in meaning to 'relapse' in this context. Though this test was constructed as a vocabulary test, it emerged with marker loading on the second factor. This might be because of the fact that items like the example given above required the students to have not only word knowledge but also to infer the meaning from the context. Students' word knowledge as well as comprehension was assessed with a word like 'relapse' which happens to be an apt word to express the recurrence of a disease. (cf. Vocabulary Test I A.1 Sub Test I Appendix D)

Thus it was seen that all Vocabulary Tests had emerged on this factor. At the same time Comprehension Test II, I and III also showed their presence on this factor with good loadings.

Comprehension Test II (Recognition of Idiomatic Expressions) which had a marker loading of 0.677 on this factor required the students to give the meaning of certain idiomatic and metaphoric expressions choosing from the four alternatives given.

Example (1):

He turned a deaf ear to my advice.
He _____________ my advice.

a. forgot  b. disregarded
c. abandoned  d. criticised

Example (2):

He is a wolf in Sheep's clothing.
As evident from the examples this test assessed the word knowledge or vocabulary pattern of students. Therefore, this test shared common variance with vocabulary tests rather than comprehension tests. Its marker high loading of .677 on this factor and a small secondary loading of .347 on the second factor shows that major part of its variance (48%) is due to Factor A and a small part of its variance (12%) is due to Factor B. So for all practical purposes this test can be presumed as being one belonging to the defining marker test-group of vocabulary. (cf. Comprehension Test II B.2 Sub Test II Appendix D)

However, Comprehension Test I (Recognition of the Paraphrase of a Word) and Comprehension Test III (Recognition of Sentence Meaning), though they had their marker loadings on Factor A (.600 and .559 respectively), they also shared significant fair sized loadings (.529 and .489 respectively) on Factor B. Comprehension Test IV (Recognition of Meaning of Proverbs) also emerged on this factor with a fair-sized secondary loading of 0.482 though it emerged on Factor B with significant marker loading of 0.508 so these tests may be presumed to be as those belonging to the border areas of both the factors.

Comprehension Test I (Recognition of the Paraphrase of a word) which had a marker loading of 0.600.
on this factor required the testees to choose the paraphrase of the italicised word in a sentence. They were given four choices for each item.

Example (1):

The old man was rather _eccentric_. He had

a. traditional ideas
b. an unsteady character
c. odd behaviour
d. an unreliable nature.

Here, the right answer is 'c' 'odd behaviour'.

The item required the testee to have sufficient word knowledge, for, only the one who knew the meaning of the word 'odd' also, could choose the correct answer.

Example (2):

A _travelogue_ is __________

a. a letter to a travel agency.
b. a narrative of a travel.
c. a report on travellers' problems.
d. a dialogue on a travel.

Here also, the testee was required to have sufficient word knowledge i.e., he had to know the meaning of the word 'narrative' also to choose the right answer 'b'. 'a narrative of a travel.'

(cf. Comprehension Test I B.1 Sub Test I Appendix D)
Thus this test which was presumed to be a comprehension test was in fact also testing the vocabulary of the students. Therefore, its emergence on Factor A could be justified.

Similarly, Comprehension Test III (Recognition of Sentence Meaning) also emerged on this factor with marker loading of .559.

This test required the students to find out the meaning of a given sentence. They were given four explanations for each sentence.

Example:
He gave the world a lesson: never give up the ship.

a. He taught everyone to try one's best, no matter what happens.
b. He showed sailors how to take care of their ships in a storm.
c. He taught the whole world how to give up when necessary.
d. He never wanted the world to give up the ship.

Here, the right choice is 'a'. This test required the students to think and answer. Viewed that way, it was meant to be a comprehension test. But at the same time in order to get the meaning of a sentence, the testees should have a knowledge of the words or semantic units that constitute a sentence. Without adequate vocabulary a sentence becomes incomprehensible. Therefore, its occurrence on this factor was not quite out of place. Also it might be noticed that this variable had a somewhat
equivalent loading on Factor B (.489). Therefore, this variable had a relevant place in that factor also.

Comprehension Test IV (Recognition of the Meaning of Proverbs) which emerged with a secondary loading of 0.482 on this factor was a proverb test. It required the students to identify the meaning of the given proverbs from the four choices given after each proverb.

Example:

Too many cooks spoil the broth.

a. Too many bosses are not good for a job.
b. One person can do something as well as two.
c. You will have too many ideas.
d. It doesn't take much work to do a little thing.

Here, the right choice is 'a'. A proverb test requires the students to go deeper into its meaning rather than the literal meaning. Therefore, it is generally considered to be a comprehension test. This test justified that assumption by emerging with a marker loading of .508 on Factor B. At the same time this test emerged with a fair-sized secondary loading of .482 on this factor. This might be because of the fact that to get the inner meaning of a proverb students should have adequate word knowledge also. Thus this test shared almost equal variances i.e., 25 per cent and 23 per cent respectively between Factor A and Factor B. Hence this test also could be treated as one lying on the border area of these two factors.

On the basis of the defining marker loadings of Vocabulary Test VII (Recognition of the Meaning of a
Phrasal Verb) and of Vocabulary Test V (Recognition of Words in Context) and marker loadings of Vocabulary Tests III (Antonyms) Vocabulary Test IV (Recognition of a Word to replace a Phrase or Idea) Vocabulary Test VIII (Recognition of Diction and Usage) Vocabulary Test II (Synonyms) and Vocabulary Test VI (Recognition of a Keyword for a Proverb), as well as those of Comprehension Tests II (Recognition of Idiomatic expressions), Comprehension Test I (Recognition of the Paraphrase of a word), Comprehension Test III (Recognition of sentence Meaning) and Comprehension Test IV (Recognition of the Meaning of Proverbs), Factor A can be named as Word Knowledge or Vocabulary Factor.

**Factor B - Verbal Comprehension**

The rotated factor loadings for Factor II in case of Group II have been given below in the table 7.06.

Factor II has been labelled as Factor B for further discussion.

**Table 7.06 : Showing Tests High on Varimax Rotated Factor B (Group II)**

<table>
<thead>
<tr>
<th>Sl.No. of Variables</th>
<th>Names of Tests</th>
<th>Factor Loadings</th>
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</thead>
<tbody>
<tr>
<td>15</td>
<td>Reading to Note Details (Comprehension Test VII.)**</td>
<td>0.905</td>
</tr>
<tr>
<td>13</td>
<td>Reading for Inference (Comprehension Test V)  **</td>
<td>0.881</td>
</tr>
<tr>
<td>14</td>
<td>Reading for General Significance (Comprehension Test VI) **</td>
<td>0.870</td>
</tr>
</tbody>
</table>
** Marker (defining) tests having their significant loadings only on this factor.

* Marker tests having their major loadings on this factor.

A perusal of table 7.06 revealed that Comprehension Test VII (Reading to Note Details), Comprehension Test V (Reading for Inference) and Comprehension Test VI (Reading for General Significance) had excellent loadings on this factor.

Comprehension Test VII (Reading to Note Details) with a factor loading of 0.905 emerged as a defining marker variable as it had no significant factor loading in Factor A - Word Knowledge factor. In this test, the testee was directed to read a passage and then answer the questions based on the passage.

Example:

Once a hare and a tortoise began to argue as to

<table>
<thead>
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<th>Sl. No. of Variables</th>
<th>Names of Tests</th>
<th>Factor Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Recognition of Word Meaning (Vocabulary Test I)</td>
<td>0.653</td>
</tr>
<tr>
<td>9</td>
<td>Recognition of the Paraphrase of a Keyword (Comprehension Test I)</td>
<td>0.529</td>
</tr>
<tr>
<td>12</td>
<td>Recognition of Meaning of Proverbs (Comprehension Test IV)</td>
<td>0.508</td>
</tr>
<tr>
<td>11</td>
<td>Recognition of Sentence Meaning (Comprehension Test III)</td>
<td>0.489</td>
</tr>
</tbody>
</table>
which of them was faster. They decided to run a race over a certain distance. Almost as soon as they started, the hare was far ahead and out of sight while the tortoise had gone only a few yards.

I. They argued about the superiority of one over the other in ________

a. Physical strength
b. wisdom
c. Knowledge
d. speed

II. They decided to settle it by ________

a. Circling the whole jungle
b. Covering a few yards
c. Reaching the winning post first
d. Showing their physical strength

III In the beginning of the race,

a. The hare was faster
b. The tortoise was faster
c. They were equal in speed.
d. The hare had reached the goal.

In order to pick out the correct alternative, the examinee had to read the passage carefully giving attention to all details. Thus this test involved thorough comprehension of the passage to note the details. (cf. Comprehension Test VII, B.7. Sub Test VII Appendix D)
Similarly Comprehension Test V (Reading for Inference) emerged with an excellent marker (defining) loading of 0.881 on this factor. In this test, the testee had to read the given passage carefully, and infer what might happen next, considering the context clues in the passage. It involved comprehending the sequence of events and grasping their implications for the future. Here also, the testee's comprehension ability was involved as it would be clear from the following example.

Example:

During travel through space towards the moon, as one goes farther and farther away from the earth's gravity, one suffers a strange feeling of weightlessness.

a. You start floating in the air.
b. You start clinging to your seat.
c. You feel your weight increasing.
d. You feel no change at all.

Here, the examinee had to infer that a space traveller who suffers a strange feeling of weightlessness as he goes away from earth's gravity would start floating in the air. Hence, the right answer is 'a'. All the other items in this test required the testee to comprehend the context clues and make such inferences which could be derived from the given passages.

(cf. Comprehension Test V. B.5. Sub-Test V Appendix D)

Comprehension Test VI (Reading for General Significance) also had excellent marker (defining) loading of 0.870 on this factor. Here, the testee had to exercise judgement in selecting and relating relevant facts found in
a passage and arriving at generalisations and conclusions. Generalising becomes impossible, without properly grasping the content of the passage. Thus this test also involved comprehension ability. Here is an example.

Example:

Karim often borrowed money from others but never returned it. If the people demanded it, he would say, he never borrowed it. Now people knew his nature and would avoid him. Karim was

a. dishonest
b. a thief
c. selfish
d. miserly

The passage tells about the dishonest nature of Karim and the correct answer is 'a' 'dishonest'. Here, all the distractors were generalisations about a person's nature. Such generalisations were used for choices in all the items in this test. Therefore, in order to select the correct generalisation, the testee had to comprehend the general import of the given extract.

(cf. Comprehension Test VI. B.6. Sub Test VI Appendix D)

Comprehension Test IV (Recognition of the Meaning of Proverbs) had a marker loading of 0.509 on this factor (Factor B) and a secondary fair-sized loading of 0.482 on Factor A. Its secondary loading has already been explained in the previous section. Here it would suffice to state that this was a Proverb Test requiring the students to identify the meaning of a proverb from the four choices given.

Example:

Don't cry over spilt milk.

a. It won't do any good to cry.
b. Don't be concerned about mistakes of the past.
c. Stop crying and clean it up.
d. It is better to laugh than to cry.

Here, choice 'b' gives the correct implication of the proverb. This test was meant to measure the verbal comprehension of students. The material of the proverb is usually comprehended by students easily since it nearly always consists of the familiar objects and events of everyday life. In this test the students were expected to recognize the moral lesson a proverb conveyed rather than its superficial meaning. Therefore, this test could be rightly regarded as a test requiring comprehension. (cf. Comprehension Test IV B.4. Sub Test IV Appendix D)

However, Comprehension Test I and III with fair sized secondary loadings of 0.529 and 0.490 respectively emerged on this factor. They had emerged with marker loadings of 0.600 and 0.559 respectively on Factor A which have been explained in the previous section. Here it would suffice to state that of these, Comprehension Test I (Recognition of the Paraphrase of the Keyword) required the testee to select, out of the four choices given the one which best paraphrased the italicised word in the given sentence. Here the testees' knowledge of the meanings of words and their ability to express them in an alternative manner was tested.

Example:

Some animals *hibernate* during winter. They ___

a. Migrate to warm places
b. Enjoy a long sleep
c. Do not eat

d. Become inactive

Items like this assessed the testees' knowledge of certain facts. For example, here the testees were expected to know what hibernating animals are and what 'hibernate' means. Therefore, this test was intended to be a comprehension test. But, since the test had emerged on Factor A with a marker loading it could be assumed that the test had assessed the word knowledge of students, (hibernate) as well as their ability to understand or comprehend what, the 'hibernating animals' do when they hibernate. So on the basis of its emergence on Factor B with a fair sized secondary loading, it can be presumed that it requires sufficient ability to comprehend. (cf. Comprehension Test I B 1 Sub Test I Appendix D)

Similarly Comprehension Test III emerged on this factor (Factor B) with a fair-sized loading of 0.489. At the same time it emerged on Factor A with a marker loading of 0.559, which is explained in the previous section.

This test required the students to give the meaning of sentences. They were given four explanations for each sentence and had to choose one.

Example:
An idea may be accurate, but its expression faulty.

a. It is possible to have a correct idea that is not properly expressed.
b. Idea should always be correctly set forth.
c. An accurate idea is one that works.
d. An idea however faulty can be correctly expressed.
Here, the testees were required to read and comprehend the sentences and explanations carefully in order to choose the correct explanation. Thus this test was intended mainly as a comprehension test, though it also emerged on Factor A with a marker loading. In fact, identification of the meaning of a sentence also involved a good knowledge of words. At a higher grade level Public School children who have a reasonably high level of vocabulary are likely to fare equally well at the comprehension of the meaning of a sentence. This might be the reason for the emergence of this test on both Factor A and Factor B. Thus since Comprehension Tests I, III and IV have emerged sharing their factor loadings almost equally between Factor A and Factor B, these three tests may be conceived as those belonging to the border areas of both the factors.

However, Vocabulary Test I also emerged on this factor, with a good marker loading of 0.653, thereby giving this factor an appearance of a mixed factor. But it was not necessarily so, as substantiated in the following discussion.

In Vocabulary Test I, the testees were asked to give the meaning of the italicised word in the given sentences.

Example:

We would see intermittent flashes of light from the light house.

a. disconnected  b. suspended
b. discontinuous  d. disjointed
In a sentence like this, the testee could identify the meaning of the italicised word only with reference to the contextual clues. This involved in addition to his word knowledge (intermittent), his ability to comprehend how or why the light from the light house appears as "flashes". Hence items like the one mentioned above might have caused its emergence on the comprehension factor, even though the test was meant to be a vocabulary test. (cf. Vocabulary Test I. A.1 Sub Test I Appendix D)

Thus in view of the excellent defining marker factor loadings which comprehension test VII (Reading to Note Details), Comprehension Test V (Reading for Inference) and Comprehension Test VI (Reading for General Significance) had on this factor and the good loadings Comprehension Test I (Recognition of the Paraphrase a Keyword) and Comprehension Test IV (Recognition of Meaning of Proverbs) and fair loadings of Comprehension Test III also had on this factor, this factor could be identified as Verbal Comprehension factor.

Thus, in the case of Group II two factors of reading ability were identified viz. Word Knowledge Factor or Vocabulary Factor and Verbal Comprehension Factor. Hence, in case of Group II the investigator's hypothesis that "reading ability is not a unitary trait; but it has several facets" could be sustained.

7.8 Conclusion

Ever since 1940 many researchers have sought to identify the factors in reading comprehension. While some have identified certain factors in reading comprehension some others have maintained that reading ability is a
unitary trait. Among them Traxler (1941), Conant (1942), Thurstone (1946) and Harris (1948) are the pioneers. After conducting factor analysis studies, they concluded that one general factor is adequate to account for the reading ability of children.

As mentioned earlier Reading ability emerged as a unitary trait in the case of ninth standard Public School Girl Students of Delhi. This result was in consonance with the general consensus among the aforementioned researchers of reading ability.

On the other hand, the reading ability of the eleventh standard Girl Students of Public Schools of Delhi emerged as consisting of two factors, viz., a Word Knowledge or Vocabulary Factor and Verbal Comprehension factor. This result was in agreement with the findings of the pioneers of factor-analysis studies like Davis (1941), Langsman (1941) and Hall and Robinson (1945).

Several researches have established that with increasing age and educational experience there is a gradual differentiation of abilities. Garret states:

"Abstract or symbol intelligence changes in its organisation as age increases from a fairly unified and general ability to a loosely organised group of abilities or factors....... It seems clear that when we compare the extent of generality in tables of correlations obtained from subjects well separated in age, greater differentiation appears at the upper age level."

Garret (1946)
Reading has emerged as a composite of some specific skills at a relatively higher stage as shown in the studies of Davis (1941), Langsman (1941) Hall and Robinson (1945) Anderson (1949) Gans (1940) and Mazurkeiwicz (1957) who conducted factor analysis studies of reading comprehension with secondary, intermediate and college students.

In the present study Group I consisted of ninth grade students who belonged to the age group of 14-15 and group II consisted of eleventh grade students who belonged to the age group of 16-17. In the case of Group II, as explained earlier, reading ability emerged as a differentiated ability consisting of two factors, thereby substantiating the hypothesis that with increase in age, maturity and experience, differentiation of abilities takes place.

In a major study, Thurstone (1938) had examined the question of maturation and differentiation of abilities. After administration of his PMA tests to a large number of Chicago school students of ages five through nineteen, Thurstone could identify seven primary mental abilities. He could estimate the age of twelve years for Perceptual speed (P), age of fourteen years for Space (S) and Reasoning (R), age of sixteen years for Memory (M) and Number facility (N) age of eighteen years for Verbal Comprehension (V) and later than twenty years for Word fluency (W).

(Guilford, 1987, p. 420)

The present study revealed that in the case of Group II this differentiation of word knowledge and comprehension had taken place at the approximate age of
seventeen, thereby showing some consensus with the above mentioned findings of Thurstone.

In the case of Group I i.e., ninth grade children, as seen earlier all the comprehension tests emerged with very high loadings whereas the vocabulary test emerged with not so high loadings. This is to say that a higher proportion of variance in comprehension is accounted for by the Reading Ability factor as compared to that of the vocabulary tests. So the mental operation involved here revealed that even if children do not achieve a high level of word knowledge they can comprehend the given passages.

It has been empirically proved that factors are more clearly established and factor pattern tends to become more clear with increase in maturity, age and experience. As already stated the findings of the present study endorsed this view. But the terms 'age' and 'maturity' refer to mental age and mental maturity rather than to chronological age. As such one would have expected the differentiation of reading abilities in the case of ninth grade students of the Public Schools of Delhi as they are supposed to have better home environments, school atmosphere and other social privileges which help in creating superior reading ability than the children of other categories of schools. But this differentiation of abilities has not taken place in the case of the ninth grade girls of Public Schools of Delhi. This needs to be further investigated to arrive at any definite conclusion.

In the course of the present investigation the investigator came across three tests - Comprehension test I (Recognition of the Paraphrase of a word), Comprehension test III (Recognition of the Meaning of a sentence) and
Comprehension Test IV. (Recognition of the Meaning of Proverbs) as lying on the border areas of both the vocabulary factor and comprehension factor. It is likely that further studies on this gray areas using some new kinds of tests might reveal the emergence of yet another factor.

As the population for the present study comprised only of girl students the relationship between gender difference and differentiation of reading abilities of Public School students could not be probed into. Further research might throw light upon this aspect also.

However, the findings of the present investigation on the reading ability of the ninth and eleventh grade public schools of Delhi has partially substantiated the hypothesis of differentiation of reading abilities. Further research using some new kinds of tests, might establish the emergence of new factors or suggest further modifications of the factor interpretation in the present study.