CHAPTER IV

METHOD

The goals of this chapter are to clarify: i) the design of the study; ii) tests used; iii) the selection of samples; iv) nature of learning tasks; v) procedure employed; and vi) statistical techniques applied to analyse the data.

4-1 DESIGN

Two separate studies were conducted in order to investigate the effects of trait anxiety, psychological stress and intelligence on state anxiety and performance on three learning tasks (paired-associates, anagrams and problem solving).

Study I

A factorial between-groups design (2x2x2) was employed which consisted of two levels each of trait anxiety (high and low), as measured by the Hindi Version of A-Trait scale of State-Trait Anxiety Inventory (STAI) developed by Spielberger, Sharma and Singh (1973), Intelligence (high and low), as measured by the Hindi Version of General Mental Ability Test (GMAT) developed by Hundal (1962), and the two experimental conditions, i.e., stress and reassurance induced through ego-threatening and reassuring instructions, respectively. The 2x2x2x2 (AxBxC) design is shown in Table 4.1. There were 15 9th grade girls in each of the eight sub-groups. The dependent variables were: i) the performance on total
Table 4.1
Sampling Design (2x2x2)
Distribution of Subjects on the basis of Anxiety, Intelligence and Stress (N = 120)

<table>
<thead>
<tr>
<th>Anxiety</th>
<th>HA(60)</th>
<th>LA(60)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HI(30)</td>
<td>LI(30)</td>
</tr>
<tr>
<td>Stressor Conditions</td>
<td>ES</td>
<td>RI</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

HA - HIGH ANXIETY
La - LOW ANXIETY
HI - HIGH INTELLIGENT
LI - LOW INTELLIGENT
ES - EGO-STRESS INSTRUCTIONS
RI - REASSURING INSTRUCTIONS
number of trials to the learning criterion; and ii) total number of errors to the learning criterion on paired-associates task of moderate difficulty.

Study II

In Study II, (2x2x2x2) between-groups factorial design (Table 4.2) was employed with two levels each of A-Trait (high and low), intelligence (high and low), two stressor conditions (ego-stress and reassuring instructions) and gender (IXth grade boys and girls). The high and low levels on different independent variables except that for gender were determined on the basis of their means and standard deviations. There were 15 subjects in each cell. The dependent variables were A-State and performance scores on anagrams and problem solving tasks of moderate difficulty.

4-2 TOOLS USED

4-2.1 Hindi Version of State-Trait Anxiety Inventory (Appendix-I)

For purposes of facilitating cross-cultural research and to build an instrument for measuring A-State and A-Trait both the sub-scales of the English STAI were translated in Hindi by Spielberger, Sharma and Singh (1973). In preparing the Hindi translation essential content of the original STAI items has been maintained while advantages of some special psycho-linguistic characteristics
### Table 4.2

**Sampling Design (2x2x2x2)**

**Distribution of Subjects on the basis of Anxiety, Intelligence, Stress and Gender (N = 240)**

<table>
<thead>
<tr>
<th>Anxiety</th>
<th>HA(120)</th>
<th>LA(120)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intelligence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HI(60)</td>
<td>LI(60)</td>
<td>HI(60)</td>
</tr>
<tr>
<td><strong>Stressor Conditions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ES(30)</td>
<td>RI(30)</td>
<td>ES(30)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td>Boys</td>
<td>Girls</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

**HA** - HIGH ANXIETY  
**LA** - LOW ANXIETY  
**HI** - HIGH INTELLIGENT  
**LI** - LOW INTELLIGENT  
**ES** - EGO-STRESS INSTRUCTIONS  
**RI** - REASSURING INSTRUCTIONS
of the Hindi language have been taken. For example, the Hindi verbs 'Raha Hun' and 'Rehta Hun' correspond nicely with the concepts of the transitory state and a relatively stable trait respectively. Both the A-Trait and A-State scales of the STAI have 20 items each.

In order to establish the equivalence of the Hindi and the English forms of the STAI, these were administered in four counter balanced orders to bilingual university postgraduate students. The means for the Hindi and English editions of the STAI, A-Trait scales were comparable and the corresponding coefficient of correlation was 0.88. The correlation between the Hindi and English A-State scales was 0.85 (Spielberger et al., 1973).

The high values of item-remainder correlations and Cronbach Alpha coefficients showed that the Hindi Version is internally consistent and items comprising it are quite homogenous as is the case with the English Version. High test-retest correlations for the Hindi STAI A-State and A-Trait scales attested the reliability of both the scales. For A-State scale correlations were consistently lower varying from 0.66 to 0.37 over a period of 30 and 90 days. In contrast, the Hindi STAI A-Trait scale was stable over time as indicated by high test-retest correlations for this scale which ranged from 0.77 and 0.83 over the same period of days and these
correlations were comparable with the English STAI A-Trait scale.

The high correlation between the Hindi and English STAI A-Trait scale indicates that these scales may be considered as equivalent forms for Hindi-English bilingual subjects. The concurrent validity of the Hindi STAI A-Trait scale has been demonstrated (Spielberger & Sharma, 1976).

STAI A-Trait scale measures individual differences in anxiety proneness (Appendix I). This scale is generally used to select subjects, for research purposes, who vary in their disposition to respond to 'psychological stress' with different levels of A-State. Whereas, STAI A-State scale has proved to be a very useful experimental procedure or the level of drive, has to be measured (Appendix II).

The STAI A-State scale consists of 20 statements which ask people to respond according to how they feel at a particular moment 'in time'. The STAI A-Trait scale also consists of 20 items which ask people to report how they 'generally feel'. The range of possible scores on the STAI varies from a score of 20 to 80 on both the sub-scales. The subjects respond by rating on four categories, which for the A-State scale are: i) not at all; ii) somewhat; iii) moderately so; iv) very much so. The
corresponding categories for the A-Trait scale are: i) almost never; ii) sometimes; iii) often; iv) almost always. The STAI A-State scale is balanced with ten items scored directly and ten are reversed items. The STAI A-Trait scale has seven reversed items and thirteen directly scored items.

The Hindi Version of STAI is an internally consistent, reliable, and valid scale for measuring state and trait anxiety within their respective culture. Since the Hindi forms are essentially equivalent to the English STAI, these provide potentially useful tools for cross-cultural research.

4.2.2 Hindi Version of Hundal’s General Mental Ability Test (Appendix III)

The Hindi Version of Hundal’s ‘GMAT’ (1962) developed by Singh (1967) is a group test designed to measure the ‘general mental ability’ of the Hindi speaking students 13 to 17 years of age. The test consists of 100 test items selected on the basis of information obtained through repeated item analysis of different sub-tests included in the preliminary experiments. The items thus selected were put together to form a composite test-booklet. The number of items chosen for the various sub-tests are: Number-series (NS) 20, Analogies (Ana) 20, Classification (C) 15, Inference (Inf.) 15, Following Directions (FD) 20, Opposites (Opp.) 10, and Synonyms (Sy.) 10. The selection of items was primarily based upon two considerations: i) that the item should, as far as
possible, show progressive increase in difficulty values as we move from higher to lower class; and ii) items should have high phi. values, preferably at all levels, as far as possible. Preference was given to items of moderate difficulty, i.e., 40 to 60 per cent passing. The order of difficulty of test items was derived from the frequency tables of items passed and failed by the total group. The selected sub-test items were mixed to get a 'scrambled' or 'emnibus' type test. The items were arranged according to their individual order of item difficulty, care being taken to avoid putting up together the two items of the same subjects. In order to establish the reliability and validity of the test, the Hindi Version of 'HGMAT' was administered to students of VII, IX and XI class groups. The split-half reliability coefficients for different class groups VII to XI range from 0.85 to 0.88.

The test-retest reliability coefficient with a time gap of about three months for the students of IX class was 0.71 (N=175). The split-half reliability coefficients for different sub-tests ranged between 0.43 to 0.84. Product-moment correlations of 0.59 to 0.67 indicate high relationship between test scores and success in examination.

The validity of the test has been reported in terms of construct validity and content validity which also
includes factorial validity. The factorial structures for different class groups (VII, IX & XI) has shown that the contribution of the common factor, at each class level, virtually accounts for the total common variance. The test is thus, truly a measure of 'general mental ability'. It is important to mention that the test material has direct association with school education and as such the performance on this test is influenced by formal and informal learning in the school and society. Cattell (1963) has pointed out that tests of this type are dominantly measures of acquired intelligence.

4-3 SAMPLE

4-3.1 Preliminary Sample

Study I

A sample of 515 girls studying in IX class was randomly drawn from four high schools in Jalandar city, Punjab. Firstly, the schools were selected at random. This was followed by random selection of the sections in which the students were studying.

Study II

600 girls and 600 boys studying in the IX class were randomly selected from the different government run schools drawn from the districts of Bilaspur and Shimla of Himachal Pradesh. Random selection of sample was assured following the procedure as followed in Study I.
All these schools were quite homogeneous with regards to the methods of teaching and evaluation, and socio-economic background of the students (generally at middle SES level). Relatively large samples for the two studies were considered to pick-up extreme groups of different A-Trait-Intelligence combinations. School population was preferred over college population in order to get larger variability on anxiety and intelligence scores.

For both the two studies these subjects were tested in small groups of 10 to 15 on the 'General Mental Ability Test' (GMAT) and the A-Trait scale of the Hindi STAI.

The subjects were ensured of perfect secrecy of the results. The intelligence test was administered first. Instructions written on title page were read out and example problems were administered. When all the students understood the instructions, they were told to start. As this test has time limit of 20 minutes and items are spread on five pages, after every four minutes, the subjects were intimated about the time so that they could speed up accordingly. Scoring of intelligence test was done with the help of scoring key provided with it. On this key the correct answers are printed on the left hand side of the respective item numbers. Before starting to score, it was made sure that the page number and item
numbers of corresponding to these in the test book-let appeared on the key. The incorrect responses on all the pages were marked with a coloured pencil. When two or more choices had been marked for any single item, that item was treated as wrongly attempted item. The scores on this test is total number of correct responses made by the subjects.

Next to the intelligence test the subjects were asked to fill the A-Trait scale of STAI under standard instructions and the instructions were explained to them verbally also. They were told not to leave any question unanswered. Scoring was done as described in the test manual of the STAI (Spielberger, et al., 1970).

4-3.2 Final Sample

Study I

120 girls that constituted the final sample were selected on the basis of their scores on anxiety (A-Trait) and intelligence. Extreme groups of trait anxiety and intelligence were formed by taking the subjects scoring above and below 'mean ± 1/2 SD' on both the tests, i.e., for anxiety (A-Trait) and intelligence. The values for anxiety and intelligence are given in Table 4.3.
Table 4.3

Means and standard deviations of girls on A-Trait and intelligence tests (N=574)

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>M+1SD</th>
<th>M-1SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety (A-Trait)</td>
<td>38.94</td>
<td>8.24</td>
<td>43.05</td>
<td>35.00</td>
</tr>
<tr>
<td>Intelligence</td>
<td>45.95</td>
<td>10.77</td>
<td>51.34</td>
<td>40.54</td>
</tr>
</tbody>
</table>

Thus, four experimental groups were formed as under:

i) High A-Trait - High Intelligent (HA-HI)

ii) High A-Trait - Low Intelligent (HA-LI)

iii) Low A-Trait - High Intelligent (LA-HI)

iv) Low A-Trait - Low Intelligent (LA-LI)

These four groups of 30 subjects each were selected such that: i) the high and low A-Trait groups had similar distribution on intelligence scores; and ii) the high and low intelligent groups had approximately similar distribution on STAI (A-Trait). The means and standard deviations of the two variables, i.e., for the four experimental groups are given in Table 4.4.
Table 4.4
Means and Standard Deviations of Girls in Four Experimental Groups

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>A-Trait Mean</th>
<th>SD</th>
<th>Intelligence Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>HA-HI</td>
<td>30</td>
<td>48.30</td>
<td>7.41</td>
<td>57.73</td>
<td>7.15</td>
</tr>
<tr>
<td>HA-LI</td>
<td>30</td>
<td>48.43</td>
<td>5.13</td>
<td>32.97</td>
<td>4.55</td>
</tr>
<tr>
<td>LA-HI</td>
<td>30</td>
<td>29.10</td>
<td>4.16</td>
<td>60.40</td>
<td>5.65</td>
</tr>
<tr>
<td>LA-LI</td>
<td>30</td>
<td>27.40</td>
<td>6.25</td>
<td>31.10</td>
<td>5.95</td>
</tr>
</tbody>
</table>

Further, each of four groups was divided into two equivalent groups of 15 subjects on random basis to be assigned to two stressor conditions, i.e., ego-stress and reassuring instructions.

Study II

As in the Study I, 120 girls for the final sample were selected on the basis of their scores on A-Trait and intelligence tests. Here again extreme groups were formed by taking the subjects scoring above and below, 'mean+SD' on both the tests i.e., for A-Trait and intelligence. The relevant values for A-Trait and intelligence are given in Table 4.5.
Thus, four experimental groups were formed as under:

i) High A-Trait - High Intelligent (HA HI)

ii) High A-Trait - Low Intelligent (HA LI)

iii) Low A-Trait - High Intelligent (LA HI)

iv) Low A-Trait - Low Intelligent (LA LI)

In this case also, the four experimental groups of 30 subjects each were selected such that: i) the high and low A-Trait groups had similar distribution on intelligence scores; and ii) the high and low intelligent groups had approximately similar distribution on STAI (A-Trait). The means and standard deviations of two variables, i.e., A-Trait and Intelligence for these four experimental groups are given in Table 4.6.
Table 4.6

Means and Standard Deviations of Girls in Four Experimental Groups

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>A-Trait Mean</th>
<th>A-Trait SD</th>
<th>Intelligence Mean</th>
<th>Intelligence SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>HA-HI</td>
<td>30</td>
<td>50.93</td>
<td>4.56</td>
<td>56.43</td>
<td>5.29</td>
</tr>
<tr>
<td>HA-LI</td>
<td>30</td>
<td>51.3</td>
<td>4.39</td>
<td>25.26</td>
<td>7.68</td>
</tr>
<tr>
<td>LA-HI</td>
<td>30</td>
<td>32.63</td>
<td>3.33</td>
<td>56.43</td>
<td>5.76</td>
</tr>
<tr>
<td>LA-LI</td>
<td>30</td>
<td>31.16</td>
<td>3.85</td>
<td>24.53</td>
<td>6.79</td>
</tr>
</tbody>
</table>

Further, each of these four groups were divided into two equivalent groups of 15 subjects on random basis to be assigned to two stressor conditions, i.e., ego-stress and reassuring instructions.

Similarly, 120 boys for the final sample were selected on the basis of their scores on A-Trait and intelligence tests. Extreme groups, once again, were formed by taking the subjects scoring above and below 'mean ± SD' on both the tests, i.e., for anxiety and intelligence. These values for A-Trait and for intelligence are given in Table 4.7.

Table 4.7

Means and Standard Deviations of Boys on A-Trait and Intelligence Tests (N=600)

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>M+½SD</th>
<th>M-½SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-Trait</td>
<td>41.90</td>
<td>8.08</td>
<td>45.94</td>
<td>37.85</td>
</tr>
<tr>
<td>Intelligence</td>
<td>38.50</td>
<td>12.69</td>
<td>44.85</td>
<td>32.15</td>
</tr>
</tbody>
</table>
Thus, once again the four experimental groups were formed as follows:

i) High A-Trait - High Intelligent (HA-HI)

ii) High A-Trait - Low Intelligent (HA-LI)

iii) Low A-Trait - High Intelligent (LA-HI)

iv) Low A-Trait - Low Intelligent (LA-LI)

The precautions for selecting these groups were the same as in the case of girls. The corresponding means and standard deviations are given in Table 4.8.

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>A-Trait Mean</th>
<th>SD</th>
<th>Intelligence Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>HA-HI</td>
<td>30</td>
<td>49.63</td>
<td>1.97</td>
<td>52.86</td>
<td>7.35</td>
</tr>
<tr>
<td>HA-LI</td>
<td>30</td>
<td>50.96</td>
<td>5.25</td>
<td>24.00</td>
<td>6.08</td>
</tr>
<tr>
<td>LA-HI</td>
<td>30</td>
<td>33.23</td>
<td>4.23</td>
<td>49.76</td>
<td>3.36</td>
</tr>
<tr>
<td>LA-LI</td>
<td>30</td>
<td>32.06</td>
<td>4.09</td>
<td>20.56</td>
<td>7.45</td>
</tr>
</tbody>
</table>

Further, each of these four groups were divided into two equivalent groups of 15 subjects to be assigned to two stressor conditions, i.e., ego-stress and reassuring instructions.
LEARNING TASKS OF MODERATE DIFFICULTY

Different learning tasks differ in kind and process required in acquiring them. Differences among learning tasks may be an important variable in studies investigating the effects of various personality variables on learning. Verbal learning has attained great importance in studies dealing with human learning. For Study I, paired-associates learning task of moderate difficulty, and for study II anagrams and problem solving tasks of moderate difficulty level, have been utilized.

Study I

4-4.1 Paired-Associates Learning Task (Appendix IV)

Two different lists of paired-associates in Hindi (adjectives) were used: a practice list and one experimental list, following the lists of adjectives used and the procedure employed by Verma and Nijhawan (1972). In order to obtain the associative strength of different response words to seventy adjectives and to prepare moderately difficult lists of paired-associates, a test of seventy Hindi adjectives (within the reading and understanding capacity of the high school students) was presented verbally one by one, separately to each of 395 high school girls who were left out of the main experiment. After hearing each word, the subject had to say as many words as she could think of. The subjects
who failed to respond to more than two words out of the first ten words were excluded. Then stimulus words were written with response words. The words having 50% association values and above were taken as easy words and those having association values between 25% and 45% were considered as of moderate difficulty. 20 high and 20 low intelligent subjects selected out of the remaining 395 girls were presented these two lists (12 pairs each) on the memory drum with the exposure time adjusted at two seconds. The subject was shown the pairs on the first trial. On the subsequent trials, the stimulus word was first presented to the subject for two seconds interval during which the subject was asked to anticipate the response word. This was followed by an exposure of the response word along with the stimulus word for two seconds. Serial position effects were counteracted by varying the presentation order in a pre-arranged manner. Three different orders were employed. Learning was carried to a criterion of two errorless trials and on each trial the number of errors were noted down by the experimenter. Highly significant (P < 0.005) 't' ratios for both trials and errors showed that word pairs with high association value are learned more quickly than these with relatively lower association value (moderate difficulty). The paired-associates list used in this study had moderate difficulty level.
Study II

4.4.2 Anagrams (Appendix V)

An anagram consists of letters which the subject must re-arrange to form a word. Generally the solution word must use all the letters of an anagram (Johnson, 1966). Several attempts have been made to account for the difficulty of anagrams in terms of their structural properties.

Following Dominowski's (1966) approach, this task was constructed by the researcher. First of all, all the Hindi course books of 9th and 10th class children were explored for various Hindi words with which all the students were quite familiar. Then one hundred anagrams were constructed in Hindi. In each anagram five to seven alphabets including the 'Matras' were used. No particular sequence was used in writing an anagram. As we were mainly interested in developing a moderately difficult anagrams task, they were written in completely mixed manner. 20 high and 20 low intelligent subjects selected out of the remaining 480 girls and 480 boys were asked to solve these anagrams within 60 minutes, thereby giving 35 seconds for each anagram, on the average. The subjects in these groups were those who were not included in the final sample of the Study II. Subjects were asked to write 'D' in front of the anagrams they found difficult, 'E' in
front of the anagrams they found easy and 'M' in front of those of moderate difficulty. Anagrams which were successfully completed by 50% of all the subjects were termed as of 'moderate difficulty'. 15 anagrams of moderate difficulty were included in the final test with eight anagrams of moderate difficulty for high intelligent subjects and seven anagrams of moderate difficulty for low intelligent subjects. A practice list of five anagrams of moderate difficulty was also prepared. In all fifteen anagrams were chosen which were to be completed by subjects within 10 minutes with approximately 35 seconds for each anagram.

4.4.3 Maier and Janzen's (1969) Prisoner's Problem (Appendix VI)

In this task there are equally divided 16 cells. These cells are supposed to be in a prison. In each cell a prisoner is living. The upper left corner of the cell is marked with an 'X'. The prisoner residing in that cell goes mad and starts killing other prisoners in other cells. The killer has to reach the last cell marked with an '0' in lower right corner, after killing everyone. He can only break the wall which separates the cells not the corner or the outside wall, neither he can go back to the cell in which he has already killed a prisoner nor he can displace the dead body.
The prisoner problem requires a perception that is often overlooked. This is that the cell of the prisoner who commits the murders is unique in that it is not occupied and hence, the murderer can return to it and proceeds on a different route. Failure to make this distinction because of the tendency to overgeneralize makes this problem of moderately difficult.

4-5 INSTRUCTIONS AND PROCEDURE FOR ADMINISTRATION OF LEARNING TASKS

Study I

4-5.1 Instructions for Administration of Paired-Associates Learning Task

After selecting 120 girls from the preliminary sample as shown in Tables (4.3 & 4.4), a practice list of five paired-associates, fixed on the memory drum at the speed of two seconds exposure, was presented to the subjects to familiarize them with the nature of the learning task. The subjects were given the following instructions:

Now you will be shown some pairs of words in Hindi through two of these windows. First, one word will appear, read it aloud. Then another word will follow which is joined with it, thus, making it a pair. Read the complete pair. Again one word, then the complete pair and so on. Keep on reading. You are to memorise the second word in association with the first one. When you go through the list for the second time try to anticipate the second member as soon as the
first member makes its appearance. You will be repeatedly shown this list of pairs until you memorise and anticipate all the pairs correctly. To understand it more vividly, please see the word appearing in the window.

4-5.2 Instructions for Ego-Stress

In order to induce ego-stress after the administration of the practice list in the groups of subjects as per the requirement of the experimental design, the following procedure based on Spielberger and Smith's (1966), Sharma & Wangu's (1976), Ravinder's (1977), Glanzmann and Laux's (1978) studies was followed. With the help of false norms subjects were given the impression that any one with little capacity to think and reason out, could perform the task successfully. They were told:

The task you are going to perform is related to some kind of intelligence. Now that you have had the chance to familiarise with the task and the procedure, I shall present you another list of relatively more difficult words. Your task will remain the same. The new list will consist of entirely new words, i.e., not a single word of the list you just learnt will re-appear in the new list. Earlier studies using such lists have revealed a very strong relationship between performance and IQ. Here is a graph of the relationship we found. (A graph in which number of errors decreased dramatically as a function of IQ was shown). You can see that very intelligent subject with an IQ of 130 makes less than two errors, on an average, whereas, less intelligent subjects
make more than six (or more) errors. The average IQ lies exactly at 100. In as much as you can expect high school students to have an IQ above average, it is extremely important that you try to make as few errors as possible and learn the test as fast as you can. This is important because there is such a strong relationship between your IQ and your performance on the following list. Do you have any question?

4-5.3 Instructions for Reassurance

Groups of subjects as per the requirements of the experimental design were given the following reassurance instructions:

Before we start, perhaps I could mention a few things that will be helpful to you in the learning of the lists. I am going to show you on this memory drum. Many people get unduly upset and tense because they do not learn such lists in just a few trials. If you do not worry about how you are doing but just concentrate on the list, you will find that you learn much more easily like any other person of your age/class group. These kind of lists appear hard and it will not be surprising if you progress slowly at first and make some mistakes.

4-5.4 Procedure for Administration of Paired-Associates Task

After the presentation of the practice list and the administration of either ego-stress or reassuring instruction, the paired-associates learning task of twelve pairs (Appendix IV) was presented to all the subjects individually with the help of memory drum under standard paired-associates learning instructions. The
exposure time of memory drum was adjusted at two seconds (see Verma & Nijhawan 1972). The subject was expected to anticipate the response word of the appearance of stimulus. If there was no response in time, it was counted as an error and was noted down in the record sheet. At the same time the correct response was shown through the memory drum. Even when the subject gave a correct reply, the whole pair appeared in the window which served as a reinforcer to the subject. Emphasis was on the association between two members (stimulus - response). All the pairs were exposed until the subject reached the criterion of two successive errorless trials or twenty trials at the maximum.

**Study II**

After selecting 120 girls and 120 boys from the preliminary samples outlined in Tables (4.5, 4.6, 4.7, 4.8) following instructions for anagrams and problem solving tasks were given to the subjects individually.

**4-5.5 Instructions for Administration of Anagrams Task**

The following instructions preceded the administration of this learning task:

Here are some jumbled up words. You have to make the correct word out of these each in 35 seconds. Please write the correct word in blank space given in front of each word. See you have to work quickly and do not miss any word. The total time allotted for the task is 10 minutes.
Scoring of anagrams was done as the correct anagrams were given score of 'one' and incorrect or unsolved anagram was given a score of 'zero'. All the correct solutions were added to represent the total score of each subject.

4-5.6 Instructions for Administration of Prisoner's Problem

The following instructions preceded the administration of the problem solving task:

Below is a design showing the arrangement of cells in a prison. One day, the prisoner in the cell marked with an 'X' gone mad and wanted to kill everyone. So, he broke through walls which separated the cells and murdered the prisoners. After each killing, he would drop the dead body on the spot and go on to the next cell. He could not stand the sight of dead man, so he would never go into a cell containing a dead body. Every cell contained a prisoner and he would never break through an outside wall or a corner. When the authorities finally arrived, he has just killed the last man in the cell marked with an 'O' shown in the diagram, a path, might have taken to arrive at that cell last.

Performance score was total number of trials to learning criterion till the errorless trials with maximum trials fixed to 20. The time limit fixed for the task was 10 minutes.

4-5.7 Procedure for Administration of Anagrams and Problem Solving Tasks

Before administering stressor conditions, i.e., ego-stress and reassuring instructions, the subjects were
administered A-State scale of the Hindi STAI. Then either ego-stress or reassuring instructions (as in the case of Study I) were given to the subjects as per the requirements of the experimental design. The A-State scale was again administered after the stressor conditions have been given. Prior to the presentation of the test list of 15 anagrams a practice list of five anagrams was also given to the subjects in order to make them familiar with the task. Both the learning tasks, i.e., anagrams and problem solving were administered to the subjects under standard instructions in a counter-balancing order one after the other. This means, half the subjects were given anagrams first and the other half were given problem solving task first.

When the experiment was over, all the subjects were individually asked not to reveal the procedure to students who had not yet participated. To minimise possible failure experience, students in the ego-stress condition were told that their performance was above average.

4-6 **STATISTICAL ANALYSES**

Following statistical procedures were employed to analyse the data:
Study I

Performance

Two separate (2x2x2) analyses of variance were carried out (Edward, 1968) to study the main and interactive effects of trait anxiety, intelligence and stressor conditions on performance of high school girls on paired-associates learning task. The post-hoc comparisons were made with the help of t-test.

Study II

State Anxiety

The changes on the repeated measures of state anxiety (A-State) of high school students have been analysed separately for boys and girls by analyses of Covariance with post A-State scores Covariated against pre A-State scores as recommended by Cronbach and Furby (1970). Subsequent analysis of variance (2x2x2x2) has been performed on adjusted A-State scores of the high school boys and girls.

Performance

Two separate (2x2x2x2) analyses of variance were performed for studying the main effects of trait anxiety, intelligence, stressor conditions and gender (boys & girls) and also their interactive effects on performance of high school students on anagrams and problem solving tasks. The post-hoc comparisons were made with the help of t-test. The obtained results are given in Chapter V.