Chapter - 3

METHODOLOGY
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The problem and hypotheses formulated in the earlier chapter were investigated on a sample of female subjects (19-27 yrs of age) selected from Kurukshetra University teaching departments.

Sample

A total of 175 subjects were used in the study. Firstly, a sub sample of 20 subjects was used in the pilot study. Subjects were having working knowledge of Hindi and English. Second, sub sample of 30 subjects from the same population was used for selection of words and nouns for tasks. Third group of 25 subjects was used to select the paired associates. Thus 75 subjects from the same population served as subsidiary sample. For final experimentation a sample of 100 subjects was drawn from the same population. All the subjects reported themselves to be in a good health and free of perceptual problems. None had participated in the prior research on implicit memory.

Design

Single group was repeated for different tasks of implicit and explicit memory (ten). The sequence and order of eight tasks of implicit memory were controlled by independently randomizing for each subject. However, the tasks of recognition and free recall were always given at serial number nine and ten. It was done to keep the subjects uninformed about the basic purpose of testing the memory. Instructions and task designing was such that S used the material in one or another way during study as
well as some other way during testing. Even during recall, the study material was presented in incidental learning setting. All the subjects were also requested not to discuss the contents of tasks so as to avoid inter-subject communication. Even it was to be ensured through introspection that no test aware subject would be included.

The number of tasks for implicit memory was eight, whereas remaining two tasks were of explicit memory. Each task consists of four phases. Their sequence is described as:

(i) Instruction and Practice phase
(ii) Study phase
(iii) Distraction phase (Filled retention interval of 3mts)
(iv) Testing phase.

The number of items reproduced or used in the testing phase common to the items of the study phase served as dependent measure or score of memory. During the testing phase, latency for each item was also measured and recorded, being the second dependent score for each task. The order of the targets appearing in test phase was controlled by reshuffling the cards for the test phase. Number and latency of baseline words were also recorded. A total of 43 scores were derived from 10 tasks. Description of the design is given in the Table-5.
Table 5. Design of the study: Single Group repeated for ten tasks (N=100)

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<thead>
<tr>
<th>Ss</th>
<th>Memory</th>
<th>Task</th>
<th>Phases</th>
<th>I</th>
<th>II</th>
<th>III</th>
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<td>1.</td>
<td>A. I</td>
<td>1. Word Stem completion</td>
<td>Instruction &amp; Practice</td>
<td>Study</td>
<td>Retention</td>
<td>Testing</td>
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<td>Task (P)</td>
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<td>Phase</td>
<td>3 mts (RT)</td>
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<td>Task (S)</td>
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<td>3. Paired Association Task</td>
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<td>P</td>
<td>4. Word Fragment Completion</td>
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<td>5. Anagram Solution Task</td>
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<td>6. Lexical Decision Task</td>
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<td>I</td>
<td>7. Word Identification Task</td>
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<td>8. Subliminally Encoded Stimuli</td>
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<td>B. Explicit</td>
<td>1. Recognition</td>
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<td>2. (Free)Recall</td>
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<td>2.</td>
<td>A. Implicit</td>
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<td></td>
<td>B Explicit</td>
<td>9-10</td>
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<tr>
<td>3.</td>
<td>A. Implicit</td>
<td>1-8</td>
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<td></td>
<td>B Explicit</td>
<td>9-10</td>
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Verbal/written items of various types and the apparatuses were used in the experiment. Table-6 describes various items used in different tasks. All the items were presented on cards visually tachistoscopically or on the transparencies by projection on screen. In each case the items for four phases were prepared depending upon the need of the specific tasks, the items varied from 15 to 65. However, the number of targets was ten. Five items in each task were assigned for practice and instructions phase. During the study phase, usually, 15 (except lexical decision task, Recognition of subliminal stimuli task and recall task) items were marked for study phase, in which 5 were filler items presented before and after the 10 targets. In order to fill up the distraction/retention phase, various tasks such as cancellation, computation, multiplication, names of cities, countries and persons etc. were used. Generally in the testing phase, double the items than the targets were used, i.e. 20 cards. These were word items, fragments, anagrams, words and statements etc. All the items were in English and from the common words. Words did not overlap from task to task. In the task of recognition of subliminally encoded stimuli, figures and shapes were also used along with target words in the study phase. A sample of materials is appended in App-1-10.

Plain white thick (6"X6") cards written with black ink were made for the projector. Size of the letters was kept as 1" height. And 5"X5" thick cards were used for the tachistoscope (electronic). Size of the letters was 1/2" of height. All the
letters were capital case letters.

The above material was presented with following equipments.
1. Projector (Screen Master): About 15 years 'O Saw' manufactured the Epidiascope in India. Now it is known as screen master. It is a useful projector for projecting on the opaque objects and transparent slides. Spiral focusing arrangement for opaque and slide projection was also fitted with it. For centering the projection on the screen there is an arrangement for raising or lowering the front projector with the help of two leveling screws. Bulb of 500 watts (Fuji Lamp for spot light) slide carrier to hold 32"X32" and 42"X42" lantern slides, heat resistant glass plate, 6 feet of 3 wire cord and shoe are fitted in the screen master. Its overall size is L x B x H= 33"X102"X22" and total weight is of 33kgs. It is also having special cooling system. It is having quite efficient motor driven blowers which prevents the inside (back) of the 'Screen Master' from getting overheated and there is no danger of opaque objects getting burnt. The screen master is suitable for operation in 220/230 volt AC (single phase). A screen of 36" height and 48" length, white, cloth made with adjustable stand was used for projection.

2. Digital Chronoscope:- Digital chronoscope was used to measure the latency of the responses. It gives time in 8 digits. First four digits from the left hand indicate full seconds and last four indicate fractions of seconds. There is a decimal point at the four figures. Chronoscope was also having the facility to reset the time.
3. Electronic Tachistoscope:- It was a box type local made electronic tachistoscope. It has two indicators. Red for on/off and green for signal. One more push button is there by which we can throw light in a box and automatically it will be switched off after a particular preset time. It has the multistep time adjustment ranging from .005 to 2.5 second. There is a special viewing chamber for the Ss.

**Arrangement of the Apparatuses**

Arrangement of the apparatus has been done in the dark room. Subjects' chair was placed 15' away from the screen and the chair was facing toward the screen. A table was placed infront of him. Another table was lying on the side of the subject on which a digital chronoscope alongwith the key was arranged with power supply in operational state. Its on position was conditionalized through on position of projector or tachistoscope via an electric circuit. In all experimental conditions the key was pressed by the experimenter and released immediately upon hearing the subject's verbal response. Therefore, subject's latency also included E's, SRT. Voice key could not be arranged, however the inclusion of E's SRT was thorough & systematic, hence no artifact was caused by it. The overhead projector and the material used in the task was arranged behind the subjects' seat. On the right side of the projector, a chair for the experimenter was kept. In the another corner one more chair and table was placed for Electronic tachistoscope. as far as lighting arranagment is concerned, two tube lights were fitted in the two sides of the room and they were under the control of the experimenter.
<table>
<thead>
<tr>
<th>Task</th>
<th>No. of Cards</th>
<th>Phase I Instruction &amp; Practice</th>
<th>Phase II Study</th>
<th>Phase III Distraction</th>
<th>Phase IV Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Word Stem Completion (Prefix)</td>
<td>65</td>
<td>5 Words</td>
<td>15 Words: 5 fillers + 10 targets (4-8 letters)</td>
<td>25, Incomplete names of the countries</td>
<td>20 Incomplete words with tail fragments (3 letters)</td>
</tr>
<tr>
<td>2. Word Stem Completion (Suffix)</td>
<td>65</td>
<td>-do-</td>
<td>-do- (5-9 letters)</td>
<td>25, Incomplete names of the cities of India</td>
<td>20 Incomplete words with stems (3 letters)</td>
</tr>
<tr>
<td>3. Paired-association Test</td>
<td>65</td>
<td>5 Pairs of words 5 fillers</td>
<td>15 pairs of words: +10 targets</td>
<td>25 names of famous persons</td>
<td>20, Single words</td>
</tr>
<tr>
<td>4. Word fragment completion task</td>
<td>40 + one sheet</td>
<td>5 words</td>
<td>15 words: 5 fillers + 10 targets (4-7 letters)</td>
<td>Letter cancellation sheet</td>
<td>20 words fragments (2/3 letter blanks)</td>
</tr>
<tr>
<td>5. Anagram Solution Task</td>
<td>40 + one sheet</td>
<td>5 words</td>
<td>15 words: 5 fillers + 10 targets (4-6 letters)</td>
<td>-do-</td>
<td>20 de words (4-5 letters)</td>
</tr>
<tr>
<td>6. Lexical decision Task</td>
<td>65 + one sheet</td>
<td>5 words</td>
<td>20 words: 10 fillers + 10 targets (6-7 letters)</td>
<td>-do-</td>
<td>40 words: 10 Baseline 10 targets and 20 pseudo word (5-7 letters)</td>
</tr>
<tr>
<td>7. Word Identification</td>
<td>50 + one computational chart</td>
<td>5 words</td>
<td>15 words: 5 fillers + 10 targets (4-7 letters)</td>
<td>Computational chart</td>
<td>30 words (6 letters)</td>
</tr>
<tr>
<td>8. Subliminally encoded stimuli implicit liking in filling blanks</td>
<td>75</td>
<td>5 figures, Shape &amp; Words</td>
<td>30: 10 figures 10 shapes &amp; 10 words (3-9 letters)</td>
<td>20, States of India &amp; two cities (one being capital)</td>
<td>20 Statements with alternate choices</td>
</tr>
<tr>
<td>9. Recall (Incidental learning-Intentional cancellation recall)</td>
<td>15 + one sheet</td>
<td>5 words</td>
<td>10 words (6-7 letters)</td>
<td>Cancellation sheet</td>
<td>Plain Paper</td>
</tr>
<tr>
<td>10. Recognition task</td>
<td>40 + one Multiplication</td>
<td>5 words</td>
<td>15: 5 fillers 10 targets (5-7 letters)</td>
<td>Multiplication chart</td>
<td>20 words (5-7 letters)</td>
</tr>
</tbody>
</table>
**Procedure**

The overall study was conducted in two stages

1. The Pilot study (Pretesting Experiment)
2. The Final Study (Testing Experiment)

1. The Pilot Study

i) Selection of the material:

For the selection of words Kuckra & Francis list was mentioned in the journals but that list will not be applicable in the Indian situations, so the words were selected from a regular Dictionary. For all the ten tasks mentioned in the Table 63, simple nouns and common words were selected. Total population of words was 800 from the Bharagava's Eng-Hindi regular dictionary and presented in a nonalphabetical order. The list of words were shown to the 30 post graduate students and were asked to rate at five point scale in terms of the commonness or familiarity with the words, words with mean less than 3 were selected. The size of the words varied from 3 to 9 letters, majority of them of the 5 and 6 letters. For paired association task and subliminally encoded stimuli task also simple words were selected. As far as the word stem completion task (prefix & suffix) words were selected of such type, in which by putting prefix and suffix other four to five words could be made. Similarly as in the case of word fragment completion & anagram task in which two to three words could be made. Word association method and its variants are used in psychology and psychoanalysis for variety of purposes
to reveal underlying needs, motives etc. Though the individuality in responses is highlighted in such contexts, generality of responses or certain typical associates with relatively high frequencies are very common. Such responses can be conveniently termed as natural associates. Therefore in selecting material for paired association task, we required 20 pairs, 5 to be used for practice & instruction phase, 5 filler pairs and 10 target pairs for the study phase. The response component of the target pairs was critical as implicit memory score would depend on it. Therefore the response to these 20 stimuli words was obtained in pilot study from 25 Ss who were asked to give associate to the words. The modal associates were taken as response components of pairs.

ii) Initial try out of the tasks:

The purpose of the pretesting study was to try for the exposure time, instruction sets, duration of different phases in various implicit memory tasks, the selection of tasks and the selection of material/items to be used in the implicit memory tasks (earlier mentioned in design) were administered separately on a sample of 20 subjects.

2. The Final Study

Each subject was tested individually in a single session of approximately 2 hrs. The whole session consisted of administration of 10 tasks (as named in design & materials sections). Out of ten, eight were such which are generally categorized as measures of implicit memory and 2 as explicit memory. All the tasks were administered on each individual one
by one in a dark room situation. Intertask interval was of 2 minutes. A set of general instructions were given to S - about the task, familiarity of the apparatus, (pseudo) purpose of study etc. "You are welcome to the laboratory of the department. I think you have come first time to this lab. It is a dark room. We have projector and screen to show some material to you. We have a timing device also to measure time. You are here to participate in a long experiment consisting of variety of tasks with some rest pauses to avoid fatigue. Through these tasks we will measure your abilities in verbal, numerical, general awareness, vigilance, and attentivity etc. You will also note that many tasks are similar, but we have arranged them so that monotony and boredom may be avoided. You are here to cooperate in a scientific endeavor and the success of the study heavily depends on you. I am sure you will bear with us."

Description of the procedure of each task follows :-

**Word Stem Completion (Prefix)**

After establishing a rapport with the subject, brought into the experimental situation, the subject was told that we are going to give you some tasks. Before the start of the task you will be given instructions. You have to follow these instructions. A pile of stimulus cards, marked for the word stem completion (Prefix) was arranged in a required order and the recording sheet was placed on the experimenter's table. A total of 65 cards with single item on each card were used in four
phases of the experiment (Appendix-I).

Performance of the task began with the instructions for practice session. Five cards to be used in this phase were taken out for projection. The S was instructed as "we are going to start the first experiment. You will see some words one by one on the screen in English. Speak aloud the meaning of the word in Hindi and then use the word in a sentence in Hindi or English as you feel convenient. For example, Balance - संतुलन 'one should eat balanced diet'. We are merely interested in assessing your skill of making sentences correctly and quickly. If you feel some difficulty with a particular word, do not bother, go ahead with the word to be exposed next shortly".

After the instructions, the words were projected one by one for 20 sec. exposure. The subject spoke aloud the meaning and made the sentences. After 5 words, the S was asked as "Have you followed the procedure: Is the exposure time sufficient? If O.K., should I continue to show the words?" The subjects' responses were not recorded. Finding S going easy, the study phase followed. A set of 15 cards with single word was taken out and so arranged that the first three cards and last two cards to serve as filler items, while the other 10 cards in between the filler items would serve as the target words, which were used in the testing phase of the experiment. All the 15 words were exposed one by one. Subject continued to speak the sentence and meaning for the stimulus word. The words were presented either soon after the preceding sentence was over or after the 20 second of the previous word in case when subject did not come out with
the sentence within the 20 seconds. Though it happened rarely, yet no record of it was maintained as the purpose of the phase was to expose the targets for a maximum of 20 sec time interval.

When all the items were completed the S was engaged in a distraction work for 3 mts in which S was asked "to complete the names of the countries (words) one by one with the help of the tail/suffix projected on the screen, e.g. -rica (America). You will find that with some of the given stimulus word tails, more than one name of the country could be made. You have to complete them by a name that comes first into your mind. Have you followed? In case you feel some difficulty in completing the word, never mind and wait for the next exposure. We are merely interested to know how quickly and spontaneously you complete the names of countries from tail ends.

Since the distraction phase and the testing phase were similar in nature and did not require additional instructions, the cards assigned for both phases were arranged. The incomplete names of the countries were presented one by one until 3 minutes and then in the same sequence the 20 incomplete word tails were also presented for testing the implicit memory of the target items. Subject was instructed that now you will see parts of the words instead of incomplete names of the countries.

Among the 20 incomplete words, 10 were the targets while other 10 were the base line words. These target words were randomly mixed with the base line words. In each case the three last letters were presented and it was possible to complete it in various words. The target was one of such possibility, e.g.,
ior, interior, exterior, inferior, etc. Superior was the target. Each time the incomplete word of testing phase was projected, the electronic time started. As and when, S come out with the complete word of the given tail, the chronoscope was switched off. The response of the S and the time taken to complete the word were recorded and entered in the table. The projected card was removed from the projector and the chronoscope time was reset. The procedure continued until the entire list was exhausted.

**Word-Stem Completion (Suffix)**

With the completion of word stem completion (Prefix), Subject was given 2 minutes rest interval. Then the necessary arrangements for the next task were made by the experimenter and the subject was instructed for that. The entire procedure for stem completion by adding the suffix was exactly similar to that of adding the prefix (just described above) up to the study phase. The subject was instructed that in the earlier task we had tested her ability and speed of completing words from tail incompletes. Similarly in this task she has to complete words from stems. She may face that many completions were possible, but she was advised to come with the first name or word that comes to mind.

When all the items of the study phase including fillers were completed the S was engaged in a distraction work for 3 minutes. This task differed from previous one in the distraction phase in the sense that instead of incomplete names of the countries, S was asked to complete the names of the cities with
the help of given prefixes. So the incomplete names of the cities were presented one by one until 3 minutes were over. In the same sequence 20 words were also presented for testing implicit memory of the target items (Appendix - 2). Three lettered word stems were presented, e.g., car_____. Completions may be card, carrier, carrom, cartoon, carrot, carcinogen, carporal etc. Carrot was target. Subject was to come forward with a single word within 20 seconds. For each word stem subject's completion and latency was recorded.

**PAIRED ASSOCIATION TASK**

During the inter task interval the stimulus cards for the paired association task were arranged in a required manner and the recording sheet for the task was placed on the experimenter's table. The total of 65 cards with single item on each card were used in four phases of the experiment (Appendix - 3).

Paired association task was started with the instruction and practice session. Five cards to be used for this phase were taken out for projection. The S was instructed as "we are going to start the third experiment. You will see some pairs of words one by one on the screen. You have to see them carefully and make a sentence either in Hindi or in English, in which you feel convenient, by associating a pair of words and speak aloud that sentence. For example: Doctor-Nurse; Nurse helped the doctor during the operation. We are interested to know how quickly can you relate two things. Avoid long and difficult sentences. If you feel some difficulty with a particular pair then, do not bother, go ahead with the next item to be exposed very soon."
After the instructions, the paired words were projected one by one for 20 seconds exposure. The subject started speaking aloud the sentences by joining the words together. After the presentation of 5 pairs of words, the subject was asked "Have you followed the procedure? Is the exposure time sufficient, If O.K., Should I continue further?" In this phase subjects' responses were not recorded. After taking subjects' consent, the study phase was started. A set of 15 cards with a single pair of words were taken out and arranged in such a manner that the first three cards and last two cards to serve as filler items and another 10 cards in between the filler items were the target pairs. These 10 cards were the same the stimulus word of which will be used in the testing phase later on. So, pairs were projected one by one. Each card was exposed for 20 seconds only. Subject continued to speak aloud the sentences. The words were presented soon after the preceding sentence was over or after the 20 second of the previous word in case when subject did not come out with the sentence.

After the study phase the distraction work was given. In this stage the subject was shown one by one the names of the important personalities and then asked to tell about them who are they? Why are they famous, their area of fame (activity) etc. These names were shown to the subject till 3 mts were over. The subject was instructed that it is to assess his general awareness, like she was tested for name of countries and cities in earlier two experiments.

Then, material for testing phase was arranged. It
comprised a pile of 20 cards having a single word written on it. Ten base line words and 10 target words were mixed randomly. Target words were the stimulus component of the pairs shown during the study phase. For the testing phase the subject was instructed as "you will see some words one by one on the screen. You have to speak aloud the word which will come first into your mind as the associate of the exposed word. There is nothing right/wrong word, you are free to speak the associate as you wish. There is no need of thinking for it, but the spontaneity is required."

The S's response and the latency were recorded. The projected card was removed from the projector and the chronoscope time was reset. The procedure continued until the entire list was exhausted.

**Word-Fragment Completion Task (WFCT)**

After the completion of the third task, S was given two minutes to relax and light was switched on. During that period a pile of stimulus cards for the word fragment completion task were arranged in a required manner. A total of 40 cards with single item on each card and cancellation sheet were used in the four phase of the experiment (Appendix - 4).

Word fragment completion task was started with instructions & practice session. Five cards to be used in this phase were taken out for the projection. Lights were switched off. The subject was instructed as we are going to start this experiment. You will see some words one by one on the screen. First you have to pronounce the word in a louder voice and then count the number
of alphabets in it. For example, you will see the word 'solid' at the screen. First you have to say aloud 'Solid' and then 5 (No of alphabets in the word solid). If you have some confusion do not hesitate in asking any question. Try to be quick. We are interested to assess your ability to scan parts of the whole.

After the instructions, the words were projected one by one on the screen for an exposure of 20 seconds. Subject started giving responses. After 5 words, the subject was asked "Have you understood. Is the exposure time sufficient. If O.K., should I continue to show the words." The subjects' responses were not noted down during this phase. Practice session was followed by the study phase and a set of 15 cards with a single item on each card were taken out and arranged in such a manner that first 3 cards and last two cards to serve as filler items and the other 10 in between the filler items were the target words the fragments of which were later used in the testing phase. With all exposures of 20 seconds each, Subject kept on pronouncing the word and counting their alphabets.

When all the items of the study phase were over, then the subject was engaged in a distraction work for 3 minutes. Lights were switched on. A cancellation sheet and pen were given to the subject and instructed as "You have a sheet full of alphabets. You have to cancel(\) the vowels (a, e, i, o, u) only and try to do this work as quickly as possible. It is a task to assess your vigilance." Subject started doing this distraction task. In the meantime 20 cards for the testing phase were taken out. Among the 20 cards, half were the target words and remaining were the
base line words. Targets were randomly mixed with the base line words.

After the completion of distraction work, lights were switched off and subject was instructed as "you will see some incomplete words one by one on the screen, e.g. m -- n -- g. You have to complete the word which comes first into your mind. As here your answer will be morning or meaning etc. One more thing you have to keep in mind that one alphabet should be placed at one dash only. If you have any doubt, do not hesitate in asking questions. We are interested to test your verbal ability to complete word from fragments." After taking subject's consent, the testing phase was started and each word fragment was projected for twenty seconds. The electronic time was started the moment the incomplete word was projected on screen and the chronoscope was switched off when the subject came out with the complete word. The response of the subject and time taken to complete the word were recorded. The projected card was removed from the projector and chronoscope time was reset. The procedure continued till the list was completed.

**Anagram Solution Task**

Performance of the anagram task began with the instruction and practice session after 2 minutes intertask interval. Five cards to be used in this phase were taken out and lights were switched off. The subject was instructed as "we are going to start the next experiment. You will see some words one by one on the screen in English. You have to read the word in a louder voice and then count the number of vowels in it. For example,
the word is 'Business' and the number of vowels in it are 3. If you feel any difficulty with a particular word, do not bother, go ahead with the next word to be exposed. We are interested to assess your ability of selective scanning."

After the instructions, the words were projected one by one for the exposure of 2 seconds. The subject started pronouncing the words and started counting the number of vowels in it. After 5 words, this was asked, "Have you followed the procedure. If you find difficulty, do not hesitate in asking. "If O.K., should I continue to show the words." The subjects' responses were not recorded during study phase. A set of 15 words for study phase was projected one by one for the exposure of 20 seconds. Subject continued to pronounce the words and started counting the no. of vowels of the stimulus word. The words were presented soon after the preceding response was over or after 20 seconds as presented in earlier tasks.

When all the items were completed, the subject was engaged in a distraction work for 3 minutes. Lights were switched on. Subject was given a cancellation sheet and one pen and instructed as "In the cancellation sheet you have to cancel with an oblique stroke (/) the consonants only. Try to do this work as quickly as possible. It is also a test of vigilance. Do not leave a consonant and do not cancel a vowel." Subject started doing cancellation work for 3 minutes. In the meantime a set of randomly mixed cards of 10 targets and 10 base line words was arranged for testing phase. After the completion of distraction work lights were switched off and subjects were instructed as
"you will see some jumbled words (group of alphabets) like `LABCE'. You have to compose a word by arranging them into a meaningful word as `CABLE'. There can be a number of words but you have to compose a word which comes first into your mind. If you have any doubt then clarify it before the starting of the task. We are interested to assess your ability to compose word from a non word." After taking subjects' consent, experimenter started projecting jumbled words one by one. Each time the electronic timer was started when the jumbled word in testing phase was projected. As and when, subject came out with response word the chronoscope was switched off. The response of the subject and time taken by the subject to give the response were recorded. The projected card was removed and the chronoscope time was reset. The procedure continued until the entire list exhausted.

**Lexical Decision Task**

After the completion of fifth experiment, Subject was given two minutes to relax and lights were switched on. A pile of 65 stimulus cards with single item on each card for the lexical decision task was used in four phases of the experiment (Appendix - 6).

The lexical decision task was started with the instructions for practice session. Five cards to be used in this phase were taken out for projection. Lights were switched off. The subject was instructed as "Now we are going to start the next interesting experiment. You will see some words on the screen one by one. 85
Firstly you have to read the word in a louder voice and then count the number of consonants in it. For example, there is word 'Senior' and number of consonants in word 'Senior' are 3. If you have any doubt, please clarify it before the start of the list.

After the instructions, the words were projected one by one for 20 seconds exposure. The subject pronounced aloud the word and number of consonants. After 5 words, they were asked, "Have you followed the procedure? Is the exposure time sufficient? If O.K., should I continue to show the words?" The subject's responses were not recorded. Finding subject going easy, the study phase was started. A set of 20 cards with single word was taken and so arranged that the first five cards and last five cards to serve as filler items, while the 10 cards in between the filler items were the target words, which were further used in the testing phase of experiment. These 20 words were projected one by one. Subject continued to pronounce the words and count the number of consonants in it. The words were projected soon after the previous response was over or taken after 20 seconds of the previous word.

After the completion of all the items, the distraction work was give for 3 minutes. Lights were switched on. Subject was given the cancellation sheet and pen with instructions as "you will see some series of alphabets written on the sheet. You have to cancel the vowels (a, e, i, o, u) only. It is again a test of vigilance. As you were also told earlier to engage in similar task. Infact, the vigilance tasks have been broken into pieces and sandwiched in other verbal tasks intentionally because
vigilance declines if engaged in a prolonged task." Subject continued to cancel the vowels for three mts. After the completion of distraction work lights were switched off again. A set of 40 cards, each with single word was taken out for the testing phase. Among the 40 cards, 10 were the base line words, 20 were the pseudo-words and other 10 were the target words which were earlier used in the study phase. These target words were mixed with the baseline and nonwords. For the testing phase, subjects were instructed as "you will see some group of alphabets on the screen. You have to judge whether it is a word or not. If it is a word then say "yes" and if it is not, then say "no". If you have any doubt please clarify it before the start of the test." Each time when the word or pseudo-word was projected for 10 milli seconds then electronic time was started and chronoscope was switched off when the subject gave the response. The response of the subject and the time taken to give the response was noted down. Again the chronoscope was reset. Procedure continued till the entire list was completed.

**Word Identification Task**

During the inter task interval of 2 minutes the lights were switched on and the materials for the word identification task were arranged. A total of 50 cards with single item on each card were used in the four phases of the experiment (Appendix - 7).

To start the word identification task the lights were switched off. Five cards to be used for the practice phase were taken out for projection. The subject was instructed as "we are proceeding towards the next experiment. You will see some words
in English one by one on the screen. You have to speak aloud the word and meaning of that word then use into a sentence either in Hindi or in English as you feel convenient. For example, Fish keeps water clean. Avoid lengthy and difficult sentences. Try to be quick, if you feel any difficulty with a particular word then do not bother and go ahead to the next word. It will be a test of your verbal ability, i.e., the ease with which you can make sentences."

After the instructions, words were projected one by one for 20 seconds. The subject spoke aloud the meaning and made the sentences. After the presentation of 5 words, S was asked as "Have you followed the procedure? Is the exposure time sufficient. If O.K., should I continue to show words further." The subject's responses were not noted down. Finding subject comfortable, the study phase was started. A set of 15 cards with a single word on it was taken out and arranged in such a manner that first 3 cards and last two were the filler items and other 10 in between the filler items were the target words which were later used for the testing phase of the experiment. So the 15 words were projected one by one. Subject kept on speaking the sentence and meaning of the stimulus word. The words were presented either soon after the preceding sentences was over or after 20 seconds of the previous word in case when subject was not able to make a sentence.

After the completion of the study phase, subject was engaged in the distraction work, lights were switched on. Subject was given the computational chart, in which subject has to do all
sorts of calculations as additions, subtractions, multiplications and divisions. The subject was told that we are interested to know your numerical ability, the speed and accuracy. Subject continued these calculations for three minutes.

After the completion of distraction work, lights were switched off again and 30 cards for the testing procedure were taken out. Among the 30 cards, there were 20 base line words along with 10 target words, which were earlier used for the study phase. Target words were randomly mixed with the base line words for presentation. In the testing phase, subject was seated on the chair facing the Electronic tachistoscope at about 12". Tachistoscope was lying on the table. Then the subject was instructed as "you will see some words one by one through the window of the tachistoscope for a very brief period. Attend to it and speak aloud that word". We are simply interested to know how correctly you can identify words in a brief exposure. A total of 30 words was shown to the subject one by one and exposure time for each word was 10 milli second. Each time when the word was shown through tachistoscope, electronic time started. As and when subject came out with the response the chronoscope was switched off. The response of the subject and time taken to give the response was noted down and entered into the table. The card was taken out from the tachistoscope and chronoscope time was reset. The procedure continued till the 30 words were completed.

Subliminally Encoded Stimuli-Implicit Liking

After the completion of 7th task, lights were switched off
and a rest pause of 2 minutes was given to the subject. A total of 75 cards for the subliminally encoded stimuli were taken out and arranged in order (Appendix-8).

For the present task subject was seated on a chair facing towards the electronic tachistoscope which was placed on the table at the distance of 12" away from the subject. For the instruction and practice session 5 cards were taken out. Among the 5 cards, 2 were having figures, one was shape and another 2 were having words. Subjects were instructed as "You will see some figures, shapes and words for a very brief period through the window of the electronic tachistoscope. If you see some shape then count the number of sides of it. If you see some figures then tell about what is it and if you see some word then try to speak that word aloud. For example, you see □, it is a shape and has four sides. If you see a figure then name it. If you see a word, then pronounce it in a louder voice. Exposure time to present the card is too brief-05 milli second. If you are not able to recognize the shape, figure or word then do not bother and try to concentrate for the next card. We want to measure your ability to recognize things in a brief glance. It would tell your attentivity." After the instructions, the cards with figure/word/shape were projected one by one for a period of 005 milli seconds. After completing 5 cards, subject was asked as "Have you followed the procedure? The exposure time is very short. O.K., should I continue it further?" Record for the subject's responses were not maintained during this phase. After completing the 5 cards we shifted to study phase, in which 30
cards were used. Among 30 cards, 10 were having figures, 10 were having shapes and remaining 10 were having words which were treated as target words. These three types of cards were randomly mixed and shown to the subject one by one for an exposure of 0.05 milliseconds through the tachistoscope. Subject continue to give the responses. Cards were shown to the subject either soon after the preceding response was over or after 20 seconds of the previous exposure.

After the completion of the study phase, subject was engaged in distraction work for 3 minutes. Subject was asked to be seated on the chair facing towards the screen. Cards (State-Capital) each with the name of the state of our country and having two alternative names of cities were arranged and lights were switched off. For the distraction work subject was instructed as "You will see some names of the two cities situated in that state as probable capitals. For example:--

Chandigarh
Haryana

Ambala

You have to choose the correct capital of the state ". It is a test of your general awareness. The cards marked for this phase were projected until 3 minutes.

After the completion of distraction work, cards were arranged for the testing of implicit memory. For testing phase 20 cards were used. Each card was having one statement with two alternatives. Among the 20 cards, one alternative of the ten statements was among the same target words which were previously
used in the study phase and another alternative was new. Other 10 statements were also having the two-alternatives. These were considered as base line statements. For this phase subject was instructed as "You will see some statements with one blank and two alternatives. You have to choose the one which would you like more. For example, Panipat is a ______ place! Famous/Important. Be quick in giving responses. Select the alternative which strikes your mind first. There is nothing wrong or correct in your choice. We merely want to know the quickness with which you chose an alternative of your choice." Each time when the statement was projected the electric time started and the chronoscope was switched off as and when subject came out with the response. The response of the subject and time taken to complete the word were recorded and entered into the table. The projected card was removed from the projector and time of chronoscope was reset, likewise all the 20 statements were completed.

**Free Recall**

After the completion of the eight implicit memory tasks, subject was given a rest of 2 minutes. A total of 15 cards to be used in the four phases of the free recall task (Appendix-9) were arranged.

For the instruction phase, 5 cards to be used were taken out for the projection. Subject was instructed as "we are going to start this experiment. You will see some words one by one on the screen. You have to read that word first in a louder voice and then count the number of alphabets in it. For example, Simple-
6. You were engaged earlier also in similar tasks. We have divided such tasks in parts to avoid monotony."

After the instructions, words were projected one by one on the screen for 20 seconds. Subject spoke aloud and also counted the number of alphabets. After that the study phase started and 10 targets were projected one by one for 20 seconds each. Thus the material was presented in an incidental context. The subject was not instructed to study the material for retention.

After the study phase lights were switched on and subject was given a cancellation sheet to cancel the consonants for 3 minutes. Then, during the testing phase subject was instructed as "Earlier you have seen some words one by one during the study phase. You have got a paper & pen. Try to write down the maximum of earlier seen words in whatever order you like. Time of 3 minutes will be given to you". After writing down the words, the sheet was collected from the subject.

**Recognition Task**

After the completion of 9th task, S was given two minutes for rest. Material for the last task was taken out and kept in order. A total of 40 cards to be used in the four phases of the recognition task were arranged (Appendix-10).

Recognition task started with the instructions and practice phase. Lights were switched off. Five cards were used in this phase. Subject was instructed as "You will see some words one by one on the screen and you have to read the word in a louder voice and then use that word into a sentence either in Hindi or in English as per your convenience. If you face some difficulty in
making a sentence then do not bother and try to concentrate on the next coming word. You have undertaken such tasks earlier also." After the instructions, words were projected on the screen one by one for an exposure of 20 seconds. The subject read the words and made the sentences. Among the 15 words to be used for the study phase first three and last two were the filler items while remaining 10 were the target words which were required in the testing phase. Each word was exposed for 20 seconds only.

After completion of the study phase, subject was engaged in the distraction work. Lights were switched on and subject was given a multiplication chart to do the multiplication for 3 minutes. Subject was told that we want to know your speed and accuracy in multiplication, a numerical ability.

After the completion of distraction phase lights were switched off again to expose the 20 cards. Among this 10 were the target words, which were used in the study phase called old words and 10 were the base line words treated as new words. S was instructed as "you will see some words one by one on the screen. Among those some are new and some are old which you have seen before the multiplication chart. You have to tell about the words which are new and which are old" Each word was projected one by one on the screen for an exposure of 20 seconds only. Each time when the word was projected the electronic time started. As and when, subject came out with the response the chronoscope was switched off. The response of the subject and time was noted down and the card was removed from the projector.
A new card was inserted. Like this the whole list was exhausted.

In the end, a formal note of thanks was given to the subject for her cooperation during the experiment. She was particularly requested not to reveal the context, procedure and purpose of the experiment in her class, hostel etc. She was introspected for her idea about the purpose of the experiment, particularly, the test awareness.

The procedure described above for ten different tasks was followed for each of 100 subjects used in the study including laboratory settings. The only difference was in the order of the implicit memory tasks, which was independently randomized by chit-lottery method. The ninth and tenth tasks remained at the same order.

After completing the experiment, the data records were tabulated in the form of a master chart to derive the scores or measures for analysis.

**Scoring/Measures:**

As evident from design and procedure described above, the study yielded several measures (the term of dependent measure was deliberately avoided as the context of study was correlational). The performance in testing phase was only taken into account. Subject was required to complete words from stems, fragments, anagrams and to identify words in different contexts, to chose words and finally to recall and recognize words—some of them were targets while other were base line words. The criterion of correctness was followed for base line items. The criteria of
correctness and commonness from the study list was applied for implicit memory score, i.e. the number of items common to targets. For each item during testing phase the response latency was measured, i.e. the time elapsed between the presentation of the item and the response emitted by the subject. Another interpolated time measure was obtained which was termed as 'response latency advantage' (RLA), a type of priming score.

\[
\text{RLA} = \frac{\bar{x} \text{ latency of base line words} - \bar{x} \text{ latency of implicit memory items}}{\bar{x} \text{ latency of base line words}}
\]

Memory scores for free recall and recognition were also obtained. Thus five measures were obtained-

1. Implicit Memory Score,
2. Correct scores of baseline words,
3. Response latency of all items, and
4. Response latency advantage for implicit memory items vis a vis their baseline words.
5. Memory (Explicit) scores -
   a. Free recall Scores - number of items recalled from study list.
   b. Recognition measures -
      (i) Hit number of old items identified as old.
      (ii) Correct rejection - number of new items identified as new
      (iii) Miss - number of old items identified as new
      (iv) False alarms - number of new items identified as old.
   c. Response latency to all four measures of recognition.
Analysis

For analysis, t-test (suitable for single group, N=100) was used for assessing the significance of differences between scores and time of various tests. Two factor analyses by Principal component with varimax rotation were done on memory score and response latency advantages. Tests were computerized at the Council for the Social Development, New Delhi with package programmes, SPSS, Illinois, University of America. Certain statistic required for description of data, e.g. $\bar{x}$, $\sigma$, SK, Ku, frequency distribution and T-conversion etc. were also done in computer.