It has been pointed out in the preceding chapter that thought disorder is the major symptom in schizophrenic behaviour. However, various investigators are not in agreement regarding the nature of thought disorder in schizophrenia. Still, they agree that it is due to an abnormality of concept formation of some sort. As reported earlier (chapter I) there have been 4 approaches to attack experimentally this problem of thought disorder in schizophrenics. The main two of these approaches deserve special mention for experimental work. On one hand, it is said that schizophrenics are abnormally "concrete" in their thinking i.e. they react to the most readily observable characteristics of the stimuli and are unable to perform inductive reasoning as they are unable to deduce abstract generalisations. Kurt Goldstein and others are the propounders of this theory. Norman Cameron and his followers, on the other hand argue that schizophrenic concepts are over-inclusive. They are unable to maintain conceptual boundaries and incorporate into their concepts elements (some of these personal) which are merely associated with the concept, but are not an
essential part of it, this makes their thinking over-
general and less precise than normals.

It is possible to reformulate Cameron's theory of
over-inclusion in a slightly more general way so that a
number of predictions follow from it. Concept formation
can be regarded as largely the result of discrimination
learning. When a child first hears a word in a certain
context, the word is associated with the entire situation
(stimulus compound). As the word is heard again and again,
only certain aspects of the stimulus compound are rein-
forced. Generally, the extraneous elements cease to evoke
the response (the word), having become "inhibited" through
lack of "reinforcement". This "inhibition" is in some
sense an active process, as it suppresses a response which
was formerly evoked by the stimulus. "Over-inclusive
thinking may be the result of a disorder of the process
whereby "inhibition" built up, fails to suppress extraneous
elements and instead serves to include them in the process
to "circumscribe" and define" the learned response (the
word or concept). In short, it could be an extreme degree
of "stimulus generalization."

The same theory can be expressed in different
terms. All purposeful behaviour depends for its success on
the fact that some stimuli are attended to, while some
other stimuli are ignored. It is a well known fact that when concentrating on one task, normal people are quite unaware of most stimuli irrelevant to the task. It is as if some "filter-mechanism" cuts out or inhibits the stimuli, both internal and external, which were irrelevant to the task in hand, to allow the most efficient "processing" of incoming information. Over-inclusive thinking might be only one aspect of a general breakdown of this "filter-mechanism".

A large number of studies have been carried out to test both these hypotheses viz. concreteness and over-inclusion. The present investigator has made one more attempt in this work to test in his own way the above two hypotheses by using various tests and tasks designed or re-designed specially for this purpose and administered on comparative groups of thought disordered schizophrenics and normals.

The purpose of the present series of experiments was to test a fairly large number of predictions following from the general theory. The rationale for designing each of the test has been mentioned alongwith the discussion of the test.

Besides the experimental work to test the two hypotheses viz. "concreteness" and "over-inclusion", the author has also attempted to study experimentally how far
the Repertory Grid Technique based on Kelly's 'Personal Construct Theory' may provide a useful mode of investigating aspects of conceptual relationships. It has been pointed out in the introductory part that there is distinction between the condition and the process of schizophrenic thought disorder. The tests of concreteness and over-inclusion described in this chapter study, so to say, the condition of schizophrenic thought disorder; the Repertory Grid Technique proposed here and discussed towards the end of the thesis studies the process of schizophrenic thought disorder. This has been included only as an experimental work for a 'pilot' purpose.

SAMPLE

All the schizophrenic subjects tested were confirmed in-patients of the Mental Hospital at Baroda and at Ahmedabad.

The experimental group consisted of 45 thought disordered schizophrenic patients. These were selected as being typical of this diagnostic category by the psychiatrists in charge of those cases. From amongst the general group of patients who were merely labelled as "schizophrenics", the psychiatrists took pains to screen specially those cases who had prominent thought disorder with the following primary features of the talk (and inferentially
the thinking) (80).

(1) Inconsequential following of side issues.

(2) Tendencies of the thought to be directed by alliterations, analogies, clang associations, associations with accidents of the speaker's environment, symbolic meanings, and the condensation of several (perhaps mutually contradictory) ideas into one.

(3) Words used out of context, e.g. concrete meanings taken where abstract meanings would be appropriate.

(4) Clinging to unimportant detail.

(5) The use of laconic answers e.g. I don't know, may be, perhaps - indicative of emptiness and vagueness of ideas.

(6) The thought is generally marked by gape, poverty, indefiniteness and vagueness.

(7) Indications of thought-blocking.

(8) Indications of pressure of thoughts.

These represent abnormalities of form rather than content and thus are theoretically distinct from simply
delusional talk. Moreover, "schizophrenia" itself appears to be a disjuncting concept and the diagnosis may, in practice, be applied to patients manifesting one or some but not necessarily all of the five major symptoms, as defined by say, Curan and Partridge (28), viz. (1) thought disorder, (2) inadequacy or inappropriateness of affect, (3) low volition, (4) disturbances of mobility and (5) primary delusions. Thus, in psychiatric practice "thought disordered schizophrenics" seem to be regarded as a sub-group of the class of schizophrenics.

Out of these 45 cases only two were regarded as chronic, since their stay in the hospital was over two years. Needless to say, all were sufficiently well to co-operate in the rather lengthy and exacting test programme involved.

The control group consisted of 80 normals. These subjects were selected from 1st and 2nd year classes of Primary Teachers' Training College, Baroda, being both available as well as co-operative.

The two groups were fairly well matched to fall in almost nearing groups in terms of age, educational level and socio-economic status, as shown below:
Thought disordered schizophrenics

<table>
<thead>
<tr>
<th>Age</th>
<th>Mean years</th>
<th>Range</th>
<th>Normals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>32.87</td>
<td>17 - 45</td>
<td>30.7</td>
</tr>
<tr>
<td></td>
<td>7.1 grade</td>
<td>III - XV grade</td>
<td>8.0 grade VII - XII grade</td>
</tr>
</tbody>
</table>

(Grade after XI refers to subsequent number of years in college)

Further, the groups were divided in 3 economic status - Lower, Middle and higher - as under:

Lower: Having income of Rs.50 or less per month per head.

Middle: Having income of Rs.51 - 150 per month per head.

Higher: Having income of Rs.151 or above per month per head.

About 80 per cent of both the groups belonged to lower economic stratum and the rest belonged to the middle one.
Testing Procedures

Various tests and scoring procedures as discussed below were used to test the hypotheses of concrete and over-inclusive thinking of schizophrenics. The psychomotor speed of these subjects was also measured.

Tests of Psychomotor Speed

A number of previous studies \((2, 3, 4, 92)\) have found schizophrenics to be unusually slow at extremely simple psychomotor tasks, such as the speed of writing from dictation or even the speed of writing one's own name. It is difficult to see how this type of slowness can be explained in terms of "over-inclusive" thinking, since these tasks would seem to require very little thought indeed. Anyway, in order to study whether this poor psychomotor speed characterized also the present group, four sub-tests from the Babcock-Levy test \((4)\) were used. These were:

1. The speed of writing "The United States of America". The score was merely the number of seconds required.

2. The speed of writing one's own name.
   Score: number of seconds required.

3. The speed of writing a simple sentence from dictation. The sentence used, from Babcock's
battery (item 12 mc.) was "I hope to leave here very soon".

(4) The Babcock-Levy "substitution test (test 7 in Babcock's battery) was the final item. This merely requires the subject to write the appropriate number (from 1 to 5) in a symbol, using a key provided. The test would appear to be a function of simple perceptual and motor speed, although some rote learning is also involved. For scoring purpose, Babcock's scores were not followed. The score used in the present study was merely the average time in seconds required to complete each item of the test, there being 4 items (and 5 lines).

Tests of Concreteness

Previous studies suggest that schizophrenics are "concrete" in their performance. To test this hypothesis the investigator made use of the following four tests:

I. Goldstein-Scheerer Cube Test

The cube test from the Goldstein-Scheerer battery (44) formed one of the tests used in the present work to test "concreteness" in performance. This test is an
adaptation of the Koh's Block Design test. Twelve designs in all are to be copied by the subject in the original test. In the present task only first five designs of Koh's series in the increasing order of difficulty were presented to the subject (Appendix 1a). If the subject failed to copy a design, he was given a series of aids which rendered the task progressively easier and less abstract, e.g. by way of aids:

(1) Lines are introduced on the model design to show where the blocks fit together, or

(2) A large model design is substituted which corresponds to the size of the block design, or

(3) An exact replica in blocks is substituted for the printed model.

The test was administered in accordance with the instructions in the manual. Unfortunately, although the authors give a detailed description of the types of "concreteness" responses to these tests, they do not give a system of scoring them. A four point scoring scale for "concreteness" was therefore used for this test. A score of one indicates a completely abstract performance, while a score of 4 indicates a completely concrete performance. This rating scale was very carefully constructed on the basis of the criteria laid down in the manual, and each level of
performance was defined as precisely as possible. Ratings were defined as under:

Score one if solution is abstract i.e. if the subject solves without aids of graded series.

Score two if solved after a cue of giving emphasis on delineation of part-relationships.

Score three if solved after a cue of enlargement to actual block-size.

Score four if solved after a cue of actual use of block-models.

The time consumed in preparing designs was also noted in seconds. It was predicted that the average time taken by the schizophrenics would be more than that required by the normal subjects.

II. The Wisconsin Card Sorting Test

The test was designed at Wisconsin Psychology Laboratory (46, 47, 48) to study the ability to form concepts. It includes 64 response cards, each containing from one to four figures; four types of figures are included viz. stars, crosses, triangles and circles, in any one of the four colours viz. Red, Green, Yellow and Blue. Thus making in all $4 \times 4 \times 4 = 64$ cards (Appendix 1b). The figure or figures in each response card are always of the same shape.
& colour. The test was administered with little modification to suit the purpose.

Administration

Four stimulus cards were arranged on the table as under:

Green Yellow Blue Red

The subject was then instructed by the experimenter thus:

"Here are 4 cards before you. I have such other cards with me which I will classify before you under one of the four cards placed. Watch carefully why a particular card is placed in a particular category. When you feel sure of the way in which I am classifying the cards, stop me immediately and tell me the principle of classification".

Sorting of the cards proceeded first according to colour, then according to shape and last according to number. The purpose was to know the number of presentations required by a subject for the development of a particular concept. Each time the principle of sorting was detected by the subject, the numbers of cards required for that concept to be developed was noted.
Scoring was simple. It was the number of cards required by the subject for detecting the correct principle of classification. Thus for each of the three concepts, the number of presentations required was calculated for each subject in each group.

III. Feldman and Drasgow's Test of Concept Formation

Feldman and Drasgow (34) devised a simple test for concept formation, which, they thought, differentiated between schizophrenics and normal subjects. The details of their test were not reported, but a test constructed on similar principles was employed in the present study.

This test of concept formation is simpler than the tests previously described. The subjects were presented with four objects drawn on a card. For example, card one contains four circles. One of the circles is smaller than the other three which are equal, but one of the three large circles is coloured blue. Thus, in each card it is possible to group three of the objects together for one reason but another three of the objects can be grouped together for a different reason. For example, in card 1, the three white circles can be grouped together, or alternatively, the three large circles can be grouped together. The test contained 18 such different cards including the one described above,
which was used as a demonstration card (Appendix lc). For each card the subject was asked to say which three objects could be grouped together and why and then to discover an alternative method of grouping another three objects together. All the cards depicted very familiar objects of every day observation or use (e.g. a tiger, a lion, a deer, and a hawk) - three are four-legged and 3 are flesh-eaters). Whenever a subject failed to detect any concept, it was stated in clear language before the next card was presented.

It seemed that this test would be less likely to be influenced by over-inclusive thinking than the sorting tests of Goldstein and Scheerer test series, as the material is less complex and would therefore be a better measure of the ability to abstract, uncontaminated by other factors.

The test was given without a time limit, but a record was taken of the performance for each card within the first minute. Thus, two scores were possible, one based on no time limit and one on first minute's performance. This was done because Feldman and Drasgow had given the test with a time limit of one minute per item, and the effort of imposing such a time limit could thus be observed.

The "total abstraction" score used in this investigation was merely the total number of correctly identified concepts. The total possible score is 34 as there are two concepts per cards, in each of the seventeen cards.
'Rigidity' Score

Goldstein and Scheerer (44) identify "concreteness" and "rigidity". They maintain that people who have difficulty in making an abstract generalisation are rigid in that, having once produced one type of abstract classification, they have extreme difficulty in producing an alternative generalisation for the same material. The present test provides a method for assessing this type of rigidity. On each card there are two different ways of grouping the objects. Rigid people having grouped them in one way, should find it extremely difficult to find the alternative grouping. In other words they should have a low proportion of "double concepts" (cards in which both concepts are obtained). The "rigidity score" used was merely the number of "double concepts" obtained. A high score suggests flexibility, a low score rigidity.

IV. Benjamin Proverbs Test

(Appendix 1d).

A list of 14 proverbs was used. Since there appears to be no standard way of administering this test, it is worth recording the precise instructions used in the present study. These were as under:

"I am going to read a few proverbs. What I want you to do is simply to give the meaning of each one in as simple terms as possible. Let me give: an example. 'Too
many cooks spoil the broth. This means that when too many persons are concerned in a cooking task, they are likely to be less efficient than a single person would be. Now, I am going to read some more proverbs and you have to explain what they mean.” Proverbs were then read one at a time and the answers were recorded almost verbatim (no other instructions being given). (Time was also noted).

The answer to each proverb was merely rated as "abstract" or "concrete" according to Benjamin's general criteria. The score was total number of abstract answers given. If, however, no answer at all was forthcoming, that particular proverb was not counted (e.g. some subjects claimed not to have heard of some of the proverbs and these were excluded). When proverbs were omitted in this way, the score obtained was pro-rated so as to be a proportion of 14, the highest possible score.

V. Zaslow's Test

This was a simple test of concept formation and was used to measure the over-inclusion in schizophrenic patients. Test material consisted of 14 cards, each containing a drawing which gradually progressed from an equilateral triangle to a perfect circle (Appendix le). Each card was presented to the subject individually and was asked to state how many figures he would incorporate as triangles; and
after obtaining that number, the subject was again presented the same fourteen cards one by one and was asked to state how many figures he would incorporate as circles.

The average of these 14 cards were taken as the score of the subject - one score for the triangle and the other for the circle. The correct score would be one in triangle score and one in circle score as the cards contain only one correct triangle and one correct circle. It was predicted that the schizophrenics would include more figures as triangles and also more circles than one which would be the expected score from the normal subject, as there are only one correct triangle and one correct circle in each card. The expected result of including more figures as triangles and circles was considered to be a measure of over-inclusion.

Over-inclusion score for a triangle consisted of the average number of triangles detected by the subject minus one (the correct score), because whatever more than one was incorporated as triangle was indicative of the fact of over-inclusive tendency in the subject. In the same fashion over-inclusion score for circles was counted.

Tests for Over-inclusion

To test second hypothesis viz. 'schizophrenic thinking is over-inclusive', the performances on the
VI. Benjamin's Proverbs Test

If the concepts formed by schizophrenics are abnormally broad, it is possible that to them, a single proverb means more than it does to normal people. Thus the concept it illustrates will be more difficult to define. Several predictions can thus be made. First, before they start to answer, they will need a longer time to prepare what they are going to say. They should thus have an increased "reaction time", if this is defined as the time elapsing between the presentation of the proverb by the experimenter, and the first word spoken by the subject in answering. Secondly, their explanation should itself require longer to give, since it should be more complicated, (more difficult) should require more thought, and involve the use of more words. Hence in this test (the test material, presentation etc. same as described earlier in this chapter - Appendix 1f), three types of scores were noted:

(1) Reaction time score in seconds.

(2) Total time score - The total time required to give the meaning of proverbs.

(3) Average number of words required in answering Benjamin's proverbs.
It was assumed that thought disordered schizophrenics would require significantly more reaction time, more total time, and also more number of words to explain the proverb than that required by normal subjects, since the schizophrenics have tendencies to over-include.

VII. Epstein's Test for Over-Inclusive Concept Formation

This test was developed by Seymour Epstein (32) as a direct measure of "over-inclusion" in concept formation as defined by Cameron. The test consists of a list of 50 words, printed on a page. Following each stimulus word, there are 6 response words (including the word "none") (Appendix 1g). The subject is merely asked to underline all those response words which are an essential part of the concept denoted by the stimulus word. Epstein predicted from Cameron's theory that schizophrenics would underline more response words than normals, as their concepts would be more over-inclusive. This was, in fact, the case in his original study.

Three scores are used in the present study. The "over-inclusion" score is based on those words which tended not to be underlined by normal people in Epstein's study. It was scored according to Epstein's own procedure so as to make the present results comparable with his.
The test also includes neologisms. Five of the 50 stimulus words are neologisms (coming out new words or words without meaning) as are of the 5 response words. A neologism score is merely the total number of words (other than the word "none") underlined in response to a neologism, plus the number of neologisms underlined as responses.

It was also predicted that as the task would be more complicated for the schizophrenics by virtue of their more extensive and presumably more complex concepts, they should require longer to do the test. Thus, the time score was also noted.

VIII. White's Test

It was reported that schizophrenics form very large and vague categories when asked to categorize or form concepts. Mary White (97) developed a simple test which required the subject to form categories from a group of words. This test was used for the present investigation.

This test consists of 15 cards with a word printed on each one of them (Appendix 1h). The subject was presented with all the cards at a time and was given the following instructions.

"Here are 15 cards, each containing a word on it, you have to categorize in as many ways as possible and
state each time the principle on which you have categorized, e.g. words like: tiger, cow, deer, camel can be grouped together being 4-legged animal."

Even with these instructions, some subjects made inquiries as to what was expected of them - In that case the instructions were repeated. When the subject stopped categorizing, he was told to see if there were still more groupings possible. When he replied in the negative the cards were taken back.

The score was in terms of the number of categories suggested and the total time consumed by the subject.

**Qualitative Observation:** The type of categories the subject made was also noted - whether the categories were irrelevant, relevant or unusual and bizarre or whether they were clear or vague.

It was predicted that the schizophrenics would form more categories and some of them would be unusual and bizarre. In terms of time it was predicted that the schizophrenics' group would consume more time than that by the normal group. The rationale behind these predictions is that the irrelevant stimuli, both external and internal are not inhibited successfully by the schizophrenic patients. Hence such stimuli which are irrelevant to the task in hand, get entry to make the categorizing unusual, bizarre, vague and time-consuming.
IX. Stories Test

Daston, King and Armitage (29) measured over-inclusion of schizophrenic patients by devising a simple test of short stories. The principle of this test was followed in the present investigation. A short story in regional language (Appendix 1(a)) was read aloud to 45 thought disordered schizophrenics and also to the matched group of 80 normals separately. A check list of 30 positive and 30 negative statements (Appendix 1(b)) regarding the characters of the stories was then given to the group with the instruction to mark them as correct or wrong.

After this, another short story was read to the group and the same procedure (Appendix 1(b)) for the second check list was then followed.

The scoring of the above test was made in two ways: (1) The total number of correctly marked statements in each story excluding the number of wrong statements marked as correct, (2) Rightly marked statements (i.e. only R) minus wrongly marked statements (i.e. R-W), called recognition score.

It was expected that the normals will give more correct markings than schizophrenics (first scoring). But this scoring is rather crude. The subjects marking wrong statements as correct must be penalized for their mistakes and hence the second scoring of correct markings minus
incorrect markings (as in recognition score).

In the second type of scoring it was predicted that schizophrenics will have low score which would mean that they include lot of irrelevant material in their thinking and hence they include even incorrect statements as correct.

X. Sentence Completion Test

This test contained 40 incomplete sentences printed on a page in regional language (Appendix I[3]). The subjects were required to complete these. The test was administered to the two different groups separately. Before being administered, the group was instructed as under:

"I am going to give you a printed page which contains 40 incomplete sentences and you are required to complete these; you can take your own time to complete."

Scoring was simple. It was only the number of sentences completed with irrelevant material or with unusual content. The maximum score would be 40, there being only 40 sentences to be completed.

It was predicted that schizophrenics would be unable to preserve the "conceptual boundaries" of the task in hand. Thus in completing the sentences schizophrenics
would include such a variety of categories at one time that the specific problem would become too extensive and too complex for a meaningful sentence to be completed.

XI. Annagramme Test

The test is very simple and is designed to measure the over-inclusion of thought disordered schizophrenics.

The test material consisted of 5 cards - each containing a nonsense syllable written on it in regional language. There was also a sixth card which was used as demonstration card (Appendix 1k). The following nonsense syllables were used:

(1) न अ र सि ह प
(2) र अ र ल ज न अ म
(3) स ज र ल य ज भ
(4) ट र र ज न य ज भ
(5) स र ज र य ज भ
(6) अ र ल स भि तौ (demonstration card)

This test was administered to the subjects individually with the following instructions:

"I am going to give you one by one 5 cards - each containing a nonsense word on it. You are to make out from it as many meaningful words as possible. The
words you make may be small or long, but it should be meaningfull e.g. this card contains words like from which words like can be prepared.

The subject then was administered the cards one by one in the order mentioned above. The time consumed was also noted to see how much time each subject consumed on each word. When the subject completed making words from a card, he was told to see if there were still more words possible out of the said card. When he finally answered "no", that card was taken back and the next card was presented. When the subject repeated the same word in course of making words, that word was counted as one without meaning.

The scoring for over-inclusion was merely the total number of irrelevant words prepared by the subject from the 5 cards presented to him. Number of total words (relevant and irrelevant) prepared by the subject was also noted and scored under "Total words score". It was predicted that schizophrenics would prepare significantly more words out of the nonsense syllables (total words score), and the number of irrelevant words (over-inclusion score) would also be more than that by the normal subjects. This could be explained in terms of the over-inclusive tendencies of thought disordered schizophrenics.
The third score was the time score. It was the total number of seconds required to complete the test. It was predicted that thought disordered schizophrenics would have many more cues from which to select formation of words and thus would consume more time. This might be because of the general breakdown of the "filter-mechanism" working in the process of concept formation.

This finishes in part the experimental work undertaken.

Thus, in brief, the present investigator administered and recorded the various types of performances (time, number of items etc.) of the subjects in both experimental and control groups on four tests meant to test "concreteness" and seven tests to test "over-inclusion", besides the general psychomotor speed on four simple tasks (all tests as shown in Appendix 1a to k).

The results have been analysed and discussed in the next chapter.