The tests and questionnaires used at both the stages of this study were analysed in detail and are reported in the present chapter. The analysis includes:

(i) hypothesized abilities/traits the test intends to measure,
(ii) pattern of the test development,
(iii) description,
(iv) rationale
(v) time limit, if any
(vi) reliability coefficient, and
(vii) criteria of judgment and scoring system.
The rationale of each test provided the construct validity of the test. This validity was essential to understand the data, to interpret results and to draw conclusions. The construct validity if followed by empirical validity was considered an objective proof of what the test really measured. The investigator did not consider it appropriate to calculate concurrent validity by using ratings because it was not a satisfactory criterion, and particularly in India, where the rater little understands the new concept of divergent thinking behaviour. The author had to depend upon factorial validity which had many limitations in this context. For instance, tests were described in terms of significant common factor obtained by rotating the orthogonal axes. The tests could not be described in detail because many unrotated factors were neglected due to inability of grasping their psychological nature fully. However, the amount of common variance explained by each test has been described fully in Chapter VI.

It may be mentioned that the administration of every test was not included in the discussion
because all were group tests and were administered according to instructions specified in the test itself.

In this chapter, the tests are presented in two parts. Part - I consists of all the tests and questionnaires that were used at the first stage of this study. This part is followed by the rationale of dropping out certain tests from the second stage and also modifying some others for the final use. Part - II, discusses only those tools which were used at the second stage. It would not be out of place to mention that most of the tests of divergent thinking were developed on Guilford's pattern of tests of creative thinking. The pattern of remaining tests tallies with those of Getzels and Jackson, Torrance and Wallach and Kogan.

PART - I

WORD FLUENCY TEST

1. HYPOTHESIS

This test aims at measuring word fluency by motivating the examinee to generate words, as letter patterns, from memory storage to fulfil certain class requirements. Since the meanings of
generated words are of no consequence, the test is assumed to measure divergent production of symbolic units (DSU : Word fluency).

2. RATIONALE

A letter pattern that is associated with its pronunciation, syllable, letter and/or letters is transferred to the memory storage during the learning period. Whenever in future, a letter or any other stimuli appears in the conscious region, all the letter patterns that had associated with it tend to move to the sub-conscious region. Then the patterns according to the requirements of the specified class may be sorted out and transferred to the conscious region. As the word meaning is no criterion to select one of the other word, the need to cognize word meaning may be avoided. It may be added that the number of letter patterns moving from sub-conscious to the conscious region will largely depend upon two things : richness of the memory storage and the autonomy of the sub-conscious region. The examinee having rich memory storage but less free sub-conscious region may transfer only a few appropriate pattern. The production will still remain poor if the storage is
ill-equipped. Therefore the variations in the production of responses will provide a basis to measure individual differences in the production of symbolic units. The production may also share some variance with ideational fluency (DMU) because the cognition of word meaning may not be avoided totally.

3. The word fluency test is developed on the pattern of Guilford's word fluency test devised for his battery of test on creative thinking.

4. DESCRIPTION OF THE TEST

The test starts with the following general instructions:

1. The test consists of three sections. Each section provides specific instructions to answer its questions. Time limit is also included in the specific instructions.

2. As many as possible responses to each item are to be written in the space provided below the statement of the item.

3. An illustration where many words and in 'q' is given under the general instructions simply to clarify the directions.
The subject is prepared to attempt items of each section within the prescribed time. Three items are included in the first section. Each item requires the examinee to write as many words as possible with the specified letter in the end. All the items are to be answered within three minutes. Section II, also contains three items which are to be attempted within three minutes. Here, each item requires the examinee to write as many words as possible starting with the given letter. Section III, against provides three items to be completed within 4 minutes. Each item requires the examinee to produce as many words as possible, having two specified letters any where in the letter-pattern.

5. **TOTAL TIME**: 10 minutes

6. **RELIABILITY COEFFICIENT:**

The reliability coefficients calculated by Rulon's formula are .751, .633, .731 for grade VI (N = 92), grade VIII (N = 127), and grade X (N = 163) respectively. The average reliability coefficient is .65 (N = 382).
7. CRITERIA FOR JUDGING AND SCORING THE CORRECT RESPONSES ON THE WORD FLUENCY TEST.

(1) Criteria for Judgment:

To judge the appropriateness of responses, to the items of the word fluency test, the following criteria were adopted:

(i) Relevance

(ii) Sensibility of a letter pattern.

(i) Relevance: It is judged on the basis of the completeness of the letter pattern (word). A word written completely should belong to Hindi language and its spelling should be correct. A misspelt word or a syllable is considered incorrect.

(ii) Sensibility of a letter pattern (word): The word should be sensible (meaningful in the language). The letter patterns which are insensible are considered incorrect. For example, a letter-pattern ending with 'व' is 'ङङ'. It has no meaning and therefore is to be rejected.

(2) Scoring:

The letter patterns judged suitable on the basis of the set criteria are scored for the
Word fluency. One score is assigned to every correct response. The total score on the whole test is considered a measure of the word fluency.

WORD ASSOCIATION TEST

1. Hypothesis

This test aims at measuring the ability to produce various shades of frames of reference and to shift the frames within the organised structure. The divergent production of the shades and the shifts is hypothesized to measure associational fluency (DMR) and spontaneous flexibility (DMC).

2. The test is developed on the pattern of the Word Association Test used by Getzels and Jackson (1962) in their study of creativity and Intelligence: Explorations with Gifted students.

3. Rationale

The variations in structure of frames of reference of different words cannot be hypothesized if one image exists for one word (Titchener).\(^1\)

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Erdmann's hypothesis provides basis for such a variation where he remarks: "Words are signs for rather vague complexes of ideas which are more or less loosely connected. The boundaries of word meanings are blurred, vague and fluid." Therefore "... the boundary of the meaning of a word can only figuratively be represented by a net-work of lines" Ogden and Richards in the same context feel that words have no meanings as such; they get meaning by the way they are used by individuals. It is, therefore, hypothesized that every word has a boundary of frames of reference and this boundary will vary for different words. The structure of frames of reference of the same word may differ from person to person because of variations in experiences with the word. The subject with rich experiences with a word has a potentiality to produce many frames of reference.


whereas the subject with poor experiences cannot have that potentiality.

Another source influencing the production of frames of reference is the individual's personality. The individual with an autonomous sub-conscious region is likely to produce more associates of the stimulus word. Whereas the individual who cannot maintain the freedom of the region, tends to block its free production. The few free productions cannot cover the full structure of frames of reference. So the individual even having rich experiences with the word tends to produce few associates.

Thus the production of a large number of associates that cover a wide structure of frames of reference may be indicative of (i) rich experiences with the word, and (ii) autonomy of the sub-conscious region. Poor production may be obtained due to either poor experiences with the word and/or non-autonomous sub-conscious region.

4. **Description of the Test**

The test starts with the following general instructions : 
1. Some words rich for usability in different contents are given below. You have to produce as many contents as possible for each word.

2. The contexts or frames of reference are to be written in brief phrases or in one or two words. They are not to be written in sentences. Responses to each item should be written in the space provided below the statement of the item.

3. Two illustrations are included in the general instructions. One illustration demonstrates many contexts of the noun word "कठका" (KHATAKA). The other demonstrates many contents of the verb word "कतना" (cut).

   These illustrations are included in the instructions simply to clarify the directions.

4. The examinee is not to start with the production of responses until he understands the directions quite clearly.

   The test contains 8 stimulus words - 4 nouns like "गोला" and 4 verbs like "कतना". Every examinee is to produce all possible frames of reference for each word.
5. Total time limit - 16 minutes.

6. Reliability Coefficients:

The reliability coefficients were calculated by split half method corrected by Spearman Brown formula. The values of the coefficients in case of the associational fluency are .784, .688 and .812 for VI (N = 80), VIII (N = 124) and X (N = 166) grades respectively. The values in case of the spontaneous flexibility are .733, .714 and .790 for the three grades.

7. Criteria of judgment and scoring system for the word Association test.

(i) Criteria for Judgment

To judge the appropriateness of responses on this test, following criteria are used:

(a) Relevance

(b) Relatedness of the reference to the organised structure of a word.

(a) Relevance: A response is considered relevant if it belongs to the symbol of the stimulus word and sensibility is related to the domain of frames.
of reference of the word. For example, the response "चाकू" of the stimulus word "कल्प" is not an appropriate context, and therefore it is rejected. Whereas the responses "अख्ता परिणाम" is accepted as a correct context of the word "कल्प".

(b) Relatedness of the reference to the organised structure of a word:

The organised structure of frames of reference is decided by Hindi Usage. The current Hindi usages were consulted from different sources and the key is prepared. Inspite of all this, if there is a new appropriate word in the responses of an examinee, we have left the scope open and decide the scoring system to be applied.

(ii) Scoring System:

The key is used to judge the appropriateness of responses. The non-repeated associated frames of reference are considered correct. The words which had slight differences in shades of meaning are accepted as correct ones. For example, the two responses "टुकड़े करना", "घाव करना" of the same stimulus word "काटना" are considered correct although both represent the same context. Therefore the total number of appropriate responses
whether in the same context or in different contexts are assumed as a measure of the associational fluency (DMR). The total number of frames of reference produced in the whole test are assumed a measure of the spontaneous flexibility. Both type of scores were reported on the front page of the test.

**SENTENCE CONSTRUCTION TEST**

1. **HYPOTHESIS**

   This test aims at measuring the capacity to produce various semantic systems under specified conditions. It is hypothesized that the production of different semantic systems is the function of expressional fluency (DMS).

2. The test is developed on the pattern of the sentence construction test used by J.P. Guilford in his battery of creative thinking.

3. **RATIONALE**

   The conditions specify initial letters of words that are scored in framing semantic systems.
Many one word sentences corresponding to each initial letter tend to appear in subjects conscious region. But it does not appear alone; the images, percepts, feelings and actions that had associated with the words tend to move to the sub-conscious region. Thus there is rush of all types of associates corresponding to different words with each specified letter. Since the whole stuff is to be transformed in such a way that some sensible idea is communicated to the external world, the images indicative of doer, percepts indicative of doer's action, and other constituents of the stuff which qualify either the doer or the being/action take their appropriate places. This whole transfer takes place in the sub-conscious region. Systems indicative of some action and being are organized in sensible manner. Every organisation tends to move to the conscious region where it appears in the form of a sentence devised according to the specified conditions.

Therefore an examinee having rich experiences with the words, different type of actions and beings, and autonomous sub-conscious region tends to produce many sentences for each specification. The examinee rich in all the experiences but
incapable to maintain freedom of the unconscious region cannot produce different semantic systems because the organisation of associated stuff cannot take place suitably. The examinee with poor experiences with words and different types of actions and beings, too cannot produce relevant semantic systems because there is little to rush to the sub-conscious region.

Thus the production of different semantic systems is assumed to be a measure of expressional fluency of an independent thinking persons.

4. DESCRIPTION OF THE TEST

This test starts with the following major instructions:

(1) This test contains two sections. Three items in each section are given along with special instructions. You have to write as many responses as possible to each item below its statement.

(2) Two illustrations are provided to clarify the directions. One example demonstrates many two words sentences formed according to the specifications. The other example demonstrates four-word sentences.
(3) A word used once in a sentence is not to be repeated.

(4) Each section is to be completed within specified time.

In Part - I, the examinee writes any two words sentence first. He, then, writes many other two word sentences in such a way that the words in each sentence start with the first letters of words used in the first sentence. The examinee has to repeat the procedure two more times. Thus there are three items in this section. This part is to be completed within 10 minutes.

In Part - II, again there are three items. In each item four letters are specified so as to produce four word sentences. For each item as many other sentences are to be constructed as possible without repeating a word. Similarly other two items are to be attempted by every subject. This part is to be completed within 15 minutes.

5. **TIME LIMIT**: 25 minutes

6. **RELIABILITY COEFFICIENT**

The reliability coefficients are calculated
by Rulon's formula. The values of the coefficients are .763, .784 and .760 for VI (N = 75), VIII (N = 125) and X (N = 167) grades respectively.

7. CRITERIA OF JUDGMENT AND SCORING SYSTEM OF THE SENTENCE CONSTRUCTION TEST

(1) Criteria for judgment:

The responses of the subjects are evaluated on the basis of following criteria.

(1) Relevance

(ii) Meaningfulness

(iii) Prepositions in Hindi are not considered words.

(1) Relevance:

A sentence is considered appropriate only if it is constructed according to the specific conditions. The words used in constructing sentences are selected from the same language (adapted words are acceptable). To use either full-steps or signs of interrogation are necessary conditions in framing sentences. Phrases are considered irrelevant, for example, the response "किती सरकारय " is a phrase in item of two words sentence. It is rejected, whereas "किताे ब सरकारय " is considered an appropriate response.
(ii) **Meaningfulness**

A sentence communicating a complete sensible idea is considered a meaningful sentence.

(iii) **Preposition in Hindi**

If the preposition like , र , क , ह , का , are used in Hindi to complete sentences or clarify the contexts referred to in the sentence, such words are not considered as extra or additional ones.

(2) **Scoring System**

The relevant and non-repeated two-word sentence is given 1 score (1/2 + 1/2). In case, a subject changes the verb and replaces one proper noun by another one, 1/2 score is awarded. The scores obtained on section I, are added up.

In scoring a four-word sentence, the main emphasis is on the change of verbs because it is considered a basic alteration to bring changes in adverbs, adjectives etc. If a noun in the nominative case is replaced by another noun bringing total change at other places, a score of 2 (1/2 + 1/2 + 1/2 + 1/2) is awarded. If a proper
noun used in nominative case is replaced by another noun bringing total change at other places, a score of $1^{1/2}$ ($1/2 + 1/2 + 1/2$) is awarded. The total score on this section too, is calculated by adding up the scores on the different items on the test.

**NUMBER ASSOCIATION TEST**

1. **HYPOTHESIS**

   This test aims at measuring the ability to produce various shades of frames of reference and to shift the frames within the organised structure. The divergent production of the shades and the shifts is hypothesized to measure the associational fluency (DMR) and the spontaneous flexibility (DMC).

2. This test is developed on the pattern of the Word Association test reported in earlier pages.

3. **RATIONALE**

   The structure of the frames of quantitative word largely depends upon its quantitative nature. The derivates which largely determine different
frames of reference can be obtained by applying arithmetical operations to the digit represented and by looking into its cultural usages. These two sources circumscribe the boundary of meanings of the word. There are quantitative words which have larger boundaries than others. It may be observed that the boundary of the same word varies with different persons because of variations in experiences with the word. Thus a set of words may be utilized to measure individual differences in experiences with the words.

Another source to influence the structure of frames of reference is the individuals' personality. The individual with an autonomous sub-conscious region is likely to produce more associates of the stimulus word, covering a large portion of the boundary, whereas the individual who cannot maintain the freedom of the sub-conscious region, tends to block the free productions of this region. Since the few productions cannot cover the full boundary of meanings, the individual even having rich experiences with the word tends to produce less associates.

Thus the production of large number of associates that cover a wide structure of frames of reference may be indicative of rich experiences
with the word as well as the autonomy of the sub-conscious region. The poor production may be obtained due to either poor experiences with the word and/or non-autonomous sub-conscious region.

4. DESCRIPTION OF THE TEST

The test starts with the following general instructions.

(1) Some quantitative words rich for usability in different contexts are given below. You have to write as many contexts as possible for each word.

(2) Responses to each item are to be written in brief below the statement of the item.

(3) Every item is to be attempted.

(4) One illustration is included in the general instruction. The illustration demonstrates the various contexts of the quantitative word "five". The illustration clarifies the directions.

(5) Each section of the test is to be completed within the prescribed time.

(6) Do not start, until you are clear about the purpose.
The main body of the test consists of three sections; Section I — Consisting of three items is to be completed within five minutes. The examinee is to produce associates of the quantitative words "one", "two" and "three". Section II — which consists of two items: "four" and "eight", is to be completed within five minutes. The third section again contains two items (seven and thirteen) and is to be completed within five minutes.

5. TOTAL TIME: 15 minutes.

6. RELIABILITY COEFFICIENTS

The reliability coefficients are calculated by odd-even split-half reliability. The coefficients in case of the associational fluency are .891, .893, and .963 for VI (N = 81), VIII (N = 126) and X (N = 152) grades respectively. The values in case of the Spontaneous flexibility are .889, .904 and .867 for the three grades.

7. CRITERIA FOR JUDGMENT AND SCORING SYSTEM FOR THE NUMBER ASSOCIATION TEST

(1) Criteria for Judgment:

To judge the appropriateness of responses on this test, the following criteria are used:
(1) Relevance

(11) Relatedness of the frame of reference to the organised structure of the word.

(1) Relevance:

A response is considered relevant if it belongs to the symbol of the stimulus word and sensibility is related to the domain of frames of reference of the word. For example, the response "दो" of the stimulus word "दो" is not an appropriate context and therefore it has been rejected. Whereas the response "दुनाली" is a derivative of the stimulus word and is considered appropriate.

(11) Relatedness of the frame of reference to the organised structure of the word:

The organised structure of frames of reference is decided by cultural usage and derivatives of the digit written verbally. The current Hindi usages were consulted from different sources and the key is prepared.

(2) Scoring System:

The key is used to judge the appropriateness of responses. The non-repeated associated frames of
reference are considered correct. The words which had slight differences in shades of meaning are also accepted as correct ones. For example, the two responses "तौरपर" , "तौपर" of the stimulus words "चार" are considered correct although each of them refers to the same context. Another response "चौथा" to the same stimulus refers to a different frame of reference. The subject producing these three responses gets 3 scores for the associational fluency and 2 scores for the spontaneous flexibility. Therefore, the total number of appropriate responses whether fall in the same context or in different contexts are assumed a measure of the associational fluency (DMR). The total number frames of reference produced in the whole test are assumed a measure of the spontaneous flexibility (DMC). Both the types of scores were reported on the front page of the test.

**NUMBER RULES TEST**

1. **Hypothesis**
   
   This test aims at measuring the ability to produce divergent symbolic relations between any two given digits as symbols. It is hypothesized
that the production of symbolic relations is the function of the associational fluency (DSR).

2. The test is developed on the pattern of Guilford's Number Rules test used in his battery of tests of creative thinking.

3. Rationale

The two unequal numbers under the given directions motivate the examinee to provide as many numbers as possible to establish equality. Since in numerable numbers can be inserted, the arithmetical operations are to be repeated many times. As the examinee senses the inequality he tends to convert the inequality into equality by using numerous natural numbers and arithmetical operations. Many possible sets of images indicative of magnitude small or big rush to the sub-conscious region. The adjustment among the images of various magnitudes may be obtained by inserting various arithmetical operations so as to reduce the size of the inserted images according to the requirements of equality. Various sets of this type which convert the inequality into equality are generated by the subconscious region and are thrown into the
conscious region in the form of arithmetical expressions. The conscious mind expresses it in terms of numerical symbols and arithmetical operations (the relations among symbols).

The production of large number of arithmetical operations as relations among symbols may depend upon the rich experiences with natural number system, intelligent use of arithmetical operations, and autonomous functioning of the sub-conscious region. An examinee possessing all these qualities produces large number of long arithmetical expressions to convert the inequality into equality. Thus he produces large number of symbols and relations among them. The other examinee who has rich experiences with natural number system but is not able to maintain the free functioning of the sub-conscious region, cannot generate large number of the relations. Another examinee who is mediocre in having experiences with the natural system tend to produce only a few arithmetical expressions. Therefore, the production of numerous relations among symbols can be assumed as the function of the associational fluency (DSR). Speed factor i.e., rate of producing the relations can be another source of variance in the production of relations.
4. **Description of the Test**

The test starts with the following set of major instructions:

(1) In every item, two digits are given. You have to insert large number of digits and arithmetical operations as many times as possible in order to reach the last digit starting from the first one.

(2) An illustration demonstrates the use of many digits and the arithmetical operations required to obtain 6 starting from 2. Many arithmetical expressions are reported simply to clarify the directions.

(3) The responses are to be written below the statement of each item.

The test contains five items. Each item specifies the first and the last digits of an inequality, directing the examinee to produce as many arithmetical operations and digits as possible to reach the last digit, after taking start with the first one. The examinee can use lengthy expressions without repeating the same digit again and again.

5. **Total Time**: 15 minutes.
6. **Reliability Coefficients**

Odd – even split - half method of calculating the reliability coefficient is used. The values of the coefficient are .967, .912 and .846 for VI (N = 80), VIII (N = 122) and X (N = 166) grades respectively, in case of the associational fluency (the relations). The values in case of the associational fluency (digits) are .920, .901 and .930 for the three grades.

7. **Criteria of judgment and scoring system used in the Number Rules test.**

   (1) **Criteria for judgment:** To judge the appropriateness of responses, the following criteria are used.

   (i) **Relevance**

   (ii) **Correctness of the expression.**

(i) **Relevance**:

The arithmetical expressions started with the given number and ending in the second given number are considered relevant, provided the expression is correct.

(ii) **Correctness of the expression**:

The computation of the expression should
lead to the last digit. In case the last digit
is not obtained by calculations, the expression
is considered incorrect.

(2) Scoring System:

The relevant arithmetical expressions are
scored for the associational fluency. An
operation of " + " and " - ", is assigned 1
score each and that of " X " and " ÷ ", 2 scores
each. The total score on these operations gives
the associational fluency score (for operations
only).

The same ability is measured by counting the
number of different digits used in each expression.
One different digit in an expression is given one
score. Thus the total score of the associational
fluency (digits) is obtained on the whole test.

CONTROLLED ASSOCIATION TEST

1. Hypotheses

This test aims at measuring the ability to
produce multiple correlates of each of the given
words in a limited time. The relation is similarity
in meaning. Therefore the correlates determine the
different shades of a given frame of reference. The production of these correlates is hypothesized as a function of the associational fluency (DMR).

2. This test is developed on the pattern of the "Controlled Association Test" used by J.P. Guilford in his battery of tests of creative thinking.

3. Rationale:

As the subject senses the meanings of a stimulus word, its image is called for. The image is generally blurred and vague. Other similar images and percepts that had associated with the blurred image tend to co-agulate around it. These elements are the associates of the image. For Hans Hofmann, the probability getting the associates similar in meaning increases because of this clustering. All the associates tend to make the image of the stimulus word clearer and cover the domain of its meanings. They may point out all the different shades of the frame of reference in which the original word would have been used had the demanded words were not coined.

The examinee having rich experiences with the word tend to have large cluster. The size of the cluster may also depend upon the free functioning of the sub-conscious mind. The autonomous sub-conscious mind provides better opportunities for a rich cluster.

The sub-conscious mind throws the elements of the cluster i.e., associates in the conscious region through semantic content. The examinee having rich cluster tend to produce large number of correlates of the stimulus word. The mediocres have small cluster and therefore tend to produce a few correlates only. Therefore the production of large number of correlates of the stimulus words is considered a function of the associational fluency (DMR).

4. Description of the test:

This test starts with the following major instructions:

(1) Below are given some words in two parts. You are to produce synonyms of the words in part 1, and the words which are similar in meaning in response to the words in part 2.
(ii) You have to produce as many responses as possible to each item.

(iii) Two illustrations are given. One of them demonstrates the synonyms of the word "मूँगी" - earth. The other illustrates the words similar in meaning to the stimulus word "क्षोटा" - little. 9 and 8 responses are given to the two stimuli leaving space for more.

(iv) Each part is to be completed within the allotted time.

The test contains two parts. In Part - 1, three noun words (corn, book, cloth) are given as three items. They are to be completed within 6 minutes. In part 2, 5 adjectives (beautiful, white, sharp, tastee, black) are given as five items. They are to be answered within 10 minutes.

5. **Total time**: 16 minutes.

6. **Reliability Coefficient**

The reliability coefficients are calculated by using Rulon's formula. The values of the coefficients are .836, .904 and .861 for VI 
(N = 65), VIII (N = 118) and X (N = 165) grades respectively.
7. Criteria for judgment and scoring system of the Controlled Association test:

(1) Criteria of judgment:

To judge the suitability of a response, the following criteria are set up:

(1) Relevance

(11) Words reported in Hindi usage to have the same shade of meanings as the stimulus word.

(1) Relevance: A relevant response is a word in Hindi that conveys the same sense or meaning as the stimulus word. For example, some of the correlates of ANAJ (अनाज) are GALLA (ग्लाल), KANAK (कनक), but not wheat or corn since the last responses are the words of English language. The specific names or members of the class like wheat, bajra, barley in place of ग्लाल are considered in correct.

(11) Words reported in Hindi usage to have the same shade of meanings as the stimulus word:

These words are judged on the basis of scoring key prepared for the purpose. New words appeared in examinee's responses were collected and checked for the adequancy by experts in Hindi.
Thus a comprehensive list of appropriate responses is developed to judge the suitability of produced correlates.

(2) Scoring System:

Each of the relevant responses is assigned 1 score. The total score is the number of correct responses. The scores are considered to be the measure of the associational fluency (DMR).

SIMILARITIES TEST

1. HYPOTHESIS

This test aims at measuring the ability to cognize numerous similarities between two verbally specified objects. The production of similarities requires cognition of multiple analogies between the two objects and transforming each analogy as a class of characteristics. It is hypothesized that the production of numerous and unique class characteristics is the function of the ideational fluency (DMU) and the originality (DMT).

2. The test is developed on the pattern of the Similarities test used by M.A. Wallach and N. Kogan in studying modes of thinking in young children (1965).
3. **Rationale**

The verbal statement of a pair of objects under the direction of producing numerous common characteristics, brings to the focus, the percepts of objects in the same way as the actual objects would have done. All the experiences that had associated with the two objects flow along with the two percepts to the sub-conscious mind in the form of feelings, attitudes, images and percepts. The associates float freely in the autonomous sub-conscious region and form different combinations and permutations of tentative nature. A sense of satisfaction may touch the sub-conscious mind when the combination of the elements give rise to the sets of common characteristics as demanded by the item.

The autonomous sub-conscious mind permits all sorts of sets to flow to the conscious region. Many sets of relations which are the unique production of the sub-conscious region are likely to be thrown to the conscious region provided the examinee has rich experiences with the objects. Therefore a healthy person may produce many class characteristic as semantic units. Many of them may be unique and which can be considered as the function of originality in thinking.
The mediocres tend to produce a few common characteristics. Sometimes they may fail to form combinations and permutations of the characteristics. They simply tend to report the characteristics against each object. Therefore the production of common characteristics of a pair of objects is viewed as a function of the ideational fluency and the originality.

4. Description of the Test

The test starts with the following major instructions.

(1) Some pairs of objects are given below. You have to produce as many as possible general characteristics common to each pair.

(2) You have to produce as many general and unique common characteristics as possible.

(3) An illustration demonstrates the common characteristics of "orange and apple", simply to clarify the directions.

The test contains seven pairs of objects specified verbally. All the objects are taken from the physical environment of the subjects. The
pairs like curtain and rug, rat and cat, potato and carrot are such that even the subjects of low grades are well familiar with them. The pairs like scale and clock, house and military, provide challenge even to the subjects in higher grades.

5. **Total Time**: No time limit (tentatively 30 minutes).

6. **Reliability Coefficient**:

   The reliability coefficient is calculated by odd-even split - half method. The values of the coefficient in case of the ideational fluency are .833, .763 and .858 for VI (N = 76), VIII (N = 124) and C (N = 121) grades respectively. The values in case of the originality are .710, .716 and .882 for the three grades.

7. **Criteria of judgment and scoring system for the Similarities Test**:

   (1) Criteria for Judgment:

   To judge the suitability of a response for scoring purposes, the following criteria are used:

   (a) Relevance

   (b) Uncommonness of responses.
(a) Relevance:

The relation or characteristics applicable to both the objects of a pair is considered relevant. In case, the characteristics is applicable to one object of a pair and not to the other, it is considered irrelevant. For example, a response "living" to the item "Engine and man" is considered irrelevant because it is not true for engine of the train.

(b) Uncommonness of responses:

The responses given by the examinees of a particular grade to an item are classified in non-overlapping categories. The tallies are marked to find out relative infrequency of different categories of responses. Differential weights (3, 2, 1, 0) for originality are assigned on the basis of the degree of uncommonness. Similarly scoring keys are developed for all the three grades separately for every item.

(2) Scoring System:

The relevant and non-repeated responses on all the items are assigned 1 score each for ideational fluency. The sum of these scores is the measure of the ideational fluency (DMU) on this test.
The responses scored for the ideational fluency are considered suitable for awarding originality score. 0, 1, 2, 3 scores are assigned to different responses on the basis of scoring key developed before the scoring was started.

**CATEGORY-WISE THING LISTING TEST**

1. **Hypothesis**

   The test aims at measuring the ability to produce members of the specified class. The production of numerous members of the class requires the association of percept of different objects with the characteristic (an idea). It is hypothesized that the association of numerous members, common as well as uncommon with the specified class is the function of the ideational fluency (DMU) and the originality (DMT).

2. The test has been developed on the pattern of "Instances" task used by Ballach and Cogan (1965) in studying the modes of thinking in young children.

3. **Rationale**

   The specifications of a class may point out an idea, a quality or an action, to establish
a pole. Though different associates of the pole, in the form of percepts and images, tend to flow in the sub-conscious region of the mind. These elements tend to form a cluster around the pole. There may be many remotely associated percepts and images in the cluster. Such elements may appear only in case of rich creative unconscious and the autonomous functioning of the sub-conscious region. The elements of the cluster are thrown into the conscious region through semantic content. Numerous objects, common and uncommon both are produced by the examinee. It is to be noted that the production of large number of members is done by healthy individuals only. The mediocres produces a few common members only. Thus the production of numerous common and uncommon objects/members of the class is the function of the ideational fluency and the originality.

4. **Description of the test:**

The test starts with the following major instructions:

1. Some pairs of characteristics determining a class or category are given below. You have to produce the objects possessing the characteristics.
2. You have to produce as many objects as possible pertaining to every class.

3. Two illustrations of classes are given. One class specification is the "insects that are not long" and that of the other is "Things that are solid but tender". As many as 8 members of each class are reported leaving space to produce more. These illustrations are provided simply to clarify the directions.

This test contains six items. Each item specifies a class or category by two restrictions or characteristics. For example, the item "solid things that produce sound" imposes two restrictions. The characteristics point out to such a class which is known to every individual and has become a part and parcel of unconscious stuff. The test includes somewhat difficult items as well as. For example the item "objects emitting light and heat" can be responded efficiently by creative individuals only.

5. Total Time: No fixed time, however the examinee finished it approximately in 30 minutes.
6. **Reliability Coefficient**

The reliability coefficient for each dimension are calculated by split-half method. The odd-even procedure is adopted. The values of the coefficient in case of the ideastional fluency are .91, .87, and .88 for VI (N = 53), VIII (N = 179) and X (N = 158) grades respectively. And the values in case of the originality are .79, .65 and .61 for the three grades.

7. **Criteria of judgment and scoring system for category-wise Thing Listing test**

(1) **Criteria for judgment:** To judge the appropriateness of responses the following criteria are used:

(i) **Relevance**
(ii) **Uniqueness of the responses.**

(i) **Relevance:**

The objects which possess both the specified characteristic of a class are considered relevant. An object which possess only one of the two characteristics is considered irrelevant. For example, a response "Nitrogen" to the item "gases
that possess odor" is irrelevant because nitrogen is a gas but odorless.

(ii) Uniqueness of the responses

In order to determine uniqueness of responses, all the responses to an item in the whole sub-sample (a grade) were classified in non-overlapping categories and tallies were marked. The relative occurrence of each category was determined by calculating the percentage of its occurrence in the sub-sample. 0, 1, 2 and 3 weights were given to categories occurred 10 per cent and above, between 5 per cent and 9 per cent, between 2 percent and 4 percent, and below 2 per cent respectively. Thus the uniqueness of a response was determined with the help of the key. Any new response that does not belong to any of the established categories and seems production of imagination, is also considered unique.

(2) SCORING SYSTEM:

All the relevant and non-repeated responses are assigned one score each for the ideational fluency. The sum of these scores
on the whole test determine the measure of the ideational fluency of an examinee.

The differential weights are assigned to the relevant responses as measures of originality. The total score on the whole test determines the measure of the originality.

**MAKE - UP MATHEMATICAL RELATIONS TASK**

1. **HYPOTHESIS**

This test aims at measuring the ability to produce mathematical relations among symbols. The relations are produced among the quantiative figures giving mathematical description of a situation. It is hypothesized that the production of arithmetical expressions is a function of the expressional fluence (DSS) i.e., the divergent production of symbolic relations.

2. This test has been devised on the pattern of Getzels and Jackson's (1962) "Make-up Problem Test".
3. DESCRIPTION AND RATIONALE

The task consists of three paragraphs. Each paragraph is a quantitative narration of a situation from daily life. Such paragraphs are chosen because of the following reasons:

(1) They are easy to comprehend,
(2) They are simple in expression and style, to minimize variance due to language factor.
(3) Each of three situations have many aspects that can be used to formulate mathematical problems.
(4) Natural numbers are used because the examinees are well familiar with them. This is not true about algebraic numbers.

The instructions of the test read as follows:

(i) You have to search out the relations among the various figures and express them by the signs of mathematical operations.

(ii) You have to produce as many relations as possible utilizing any number of figures given in the paragraph.
(iii) You have not to write meanings of the mathematical problems in words.

(iv) One paragraph is given below (mathematical relation are demonstrated on the basis of given paragraph).

(v) There is no time limit, however finish as early as possible.

These directions motivate the subject to read the paragraphs and comprehend it. In comprehending the mathematical relations among the quantitative figures, the examinee cognizes many arithmetical questions that can be raised on the quantitative narration of the situation. The questions may be on one aspect, many aspects and/or whole of the situation. Guilford believes that comprehending arithmetical problems is mostly a matter of the ability CMS - cognition of semantic systems. He adds further that it is reasonable to expect the test to be a measure of DMS instead of DSS. However, to the author, the DMS may account for some variance.

of this test, but the production of arithmetical expression seems to be the major function of DSS because these are the numerical symbols that play significant role in translating the arithmetical problem into the expression. Therefore, three abilities CMS, DMS and DSS may account for the sizeable variance of this test.

As the examinees senses many arithmetical problems, the images of the figures and mathematical relations associate around the idea of the problem. The organisation of these associates may take place in the sub-conscious region till the idea is expressed in terms of these associates. The same adjustment among the various associates takes place for all ideas (problems) sensed by the examinee. These different adjustments may form different clusters tentively in the sub-conscious region. These clusters are thrown to conscious region where they are obtained in terms of mathematical expressions. The expressions involve various mathematical operations which convey the relations among quantitative symbols. Therefore the production of the mathematical relations is considered mainly the function of DSS (i.e., the divergent production of symbolic systems).
4. **TIME - LIMIT** : Approximately 30 minutes.

5. **RELIABILITY COEFFICIENT**

   The reliability coefficient of this test is calculated by inter-scorer reliability. The values of the coefficient are .650, .640 and .650 for VI (N = 75), VIII (N = 100) and X (N = 150) grades respectively.

6. **CRITERIA OF JUDGMENT AND SCORING SYSTEM OF THIS TEST**

   (1) **Criteria of judgment** :

      To judge the appropriateness of responses, the following criteria are set up.

      (a) Relevance

      (b) Adequacy of a digit in an expression.

(a) **Relevance** :

   The response is considered relevant if all the digits used in the expression belong to the paragraph. No additional information is needed to solve the expression.

(b) **Adequacy of a digit in an expression** :

   Correctness of a mathematical expression depends upon the judgment whether it indicates a problem or not.
(2) **Scoring System**

In an expression, the item of information is assigned 1 score and mathematical operations differing weights. Operations of + and - are assigned one score each and \( \div, \times \), 2 scores each. The sum of these scores determines the expressional fluency score.

**THE CIRCLE ELABORATION TEST**

1. **HYPOTHESIS**

This test measures figural imagination. By imaginative richness in this context, one means the ability to perceive circle in variety of situations as an integral part of bigger entity and/or an outline of the whole unit. It may also require addition of dots and lines so as to make the unit of information comprehensible. Addition of dots increases harmony of the form. The basic perceptual unit may undergo transformation so as to produce a theme through figural content. The transformation may reflect through other unique perceptual unit/object. It is hypothesized that perceptual imagination is the function of (1)figural
ideational fluency (DFU), (ii) figural spontaneous flexibility (DFC), (iii) figural transformation - originality (DFT), and (iv) figural implication - elaboration (DFI).

2. This test is developed on the pattern of Torrance's Circle Elaboration test.

3. Description and rationale

The test consists of 40 circles with a diameter of $1\frac{1}{2}$ cm. each. The circle of such a small diameter are selected so as to --

(i) make the circle a base in objects known to the subjects,

(ii) make the circle an integral part of bigger units known to the subjects,

(iii) provide opportunities for synthesizing few circles to result in better and complex whole.

(iv) maintain the interest of subjects to make new objects in large number.

(v) provide opportunities for better manifestation of figural fluency and figural flexibility.
The number of stimulus - circles is increased so as to motivate the subjects to work at a high rate. This helps in reducing the rigidity of the conscious mind and thus provide better opportunities for the manifestation of sub-conscious mind.

Instructions are provided in the beginning of the test so as to direct the thinking of subjects and motivate them to produce meaningful figures/pictures. It is in this background that the subject tries to recall, perceive/imagine figural units/objects containing circles. It is a group test to be completed within 20 minutes. No illustration is given simply to leave the children's imagination free. In one or two trials of this test, when illustration was used, most of the subjects sketched figures on the illustrated pattern.

As the subject perceives the circle as closed figure in the context prepared by the specific instructions, percepts and images at the first instance may appear in the conscious mind. But as the subject picks up the speed of drawing the figure, some stuff of the unconscious mind along with the elements of the conscious one rush to the
sub-conscious region but only in case of normal subjects. As the normal subject is able to maintain the autonomy of the sub-conscious region, all the images/percepts however immature and silly they may be, associate with the stimuli. Images of the unconscious region are much effective in stimulating the emotions and feelings of the latent life and thus to get them associated with the percepts. All the stuff arrived at in the sub-conscious region seems to be relatively free; it can, therefore, be dissociated, reunited easily under the guiding forces generated by instructions until something beautiful, humorous, satirical and novel is produced. The product appears in the conscious mind in the form of percept and images where dots, lines, curves, shades, colours etc., are added to the circle figures. A creative person tends to form complex figure-stories - depicted through pictures etc. On the other hand a non-creative individual tends to sketch simple figures Barron. 6

4. Reliability Coefficient:

50, 75 and 75 test booklets were selected from VI, VIII and X grades respectively and are

scored by two raters according to the scoring key. The average inter rater reliability coefficient for the ideational fluency, the spontaneous flexibility, the originality and the elaboration are .99, .89, .85 and .76 respectively.

5. **Time Limit**: 20 minutes.

6. **Criteria for judgment and scoring system for the circle Elaboration test.**

   **(1) Criteria for judgment**

   For assessing "Free Play of Imagination" through figural medium, two following criteria are set up:

   (i) **Relevance**

   (ii) **Production of varied and unique objects and/or pictures with details.**

   **(i) Relevance**: A figural entity (object, picture, design etc.) constructed by using at least a circle as a base for or a part of the entity is considered a relevant response. The products which were not related to the circle/circles i.e., irrelevant responses are rejected. For example, Foot-ball, Volley ball (simply written in words, and circles not elaborated),
Triangle with circumscribed circle, nonsensible figure, are considered irrelevant and therefore they are rejected. The relevant responses such as eye, human face, wheel, fruit, foot-ball, flowers are considered suitable to measure the various aspects of divergent thinking ability through figural medium.

(11) Production of varied and unique objects and/or pictures with details:

The production of varied entities with details is assumed to be the function of perceptual imagination to a great extent. The items which represent objects as they are found in surroundings may be considered more a function of memory than that of imagination. But the addition of uncommon details even to such objects, may require imagination. As the purpose of the project is to measure the involvement of divergent thinking abilities, the relevant and unrepeated responses are considered suitable for assessing their involvement.

(2) Scoring System

The Circle Elaboration test is scored for the ideational fluency, the spontaneous flexibility, the originality and the elaboration.
I. Figural ideational fluency (DFU)

Every relevant and non-repeated response is considered to be the product of ideational fluency. One unit is given one score for ideational fluency, and thus the total number of appropriate figural responses are considered a total ideational fluency score. The subjects who were at hand in drawing sketches and were not suffering by any inhibition, could produce large number of figural units. On the other hand, the subjects having handicap of drawing sketches and having certain emotional blocks, find difficult to produce figural units at a high rate. The subjects who concentrate more on adding details to the produced units, score less on the ideational fluency. Therefore there are every chance to reflect individual differences in producing figural unit. The fluency factor contributes to the total variance in the manifestation of the divergent thinking ability.

II. Figural Spontaneous flexibility (DFC)

This ability manifests in shifting the frames of references in producing figural entities. Precisely speaking, the productions belonging to different classes reflect this ability. A
subject sketching mains face, woman's face, human eye, bird's head in his four responses is considered more rigid (inflexible) in comparison to another subject producing ten, flags, football and fruit. It is so because the former shift one class in producing the four figural units, whereas the letter makes four shifts. A scoring key is prepared determining the classes of objects and pictures. This key is used for scoring purposes. The production of a class is given one score and the total number of classes determined the flexibility score for each subject. In this scheme, there is a probability that a subject gets 20 scores on ideational fluency but only one score on the flexibility and the other subject gets 20 scores on ideational fluency and the same score on the flexibility. Thus the spontaneous flexibility accounts for a sizeable variance in divergent thinking ability.

(iii) Divergent Production of Figural Transformation (DFT) - Originality:

The originality of responses is calculated on the basis of infrequency of responses. A scoring key assigning differential weights: 0, 1, 2, 3 is
prepared on the basis of selected sample. The relevant and non-relevant responses are assigned originality weights according to the scoring key. The sum of these scores determined the originality score of every subject. There is always a possibility that a subject may produce responses all having zero originality weights, thus receiving zero originality score on the whole test. Another subject may receive different originality scores: 0, 1, 2, 3 on all the responses, getting a high originality score. Similarly, most of the subjects are expected to receive different scores on this dimensions and hence the originality accounts for a sizable variability in divergent thinking ability as a whole.

(iv) Divergent Production of Figural Implication (DFI) - Elaboration:

This ability is considered to manifest in adding details to units of production. The details may be added by using dots, curves, shades and colours. One score was assigned to every new idea of the details. A subject may devote all the time in adding details only to two or three entities without producing any new item whereas
another subject may add no details to any of the produced units. The former gets a high score on 'Elaboration', whereas the latter one receives zero. Therefore the elaboration ability is considered another dimension of divergent thinking ability accounting for a sizable variance in the latter.

PARALLEL LINES (ELABORATION) TEST

1. Hypothesis

This test measures figural imagination. By imaginative richness in this context, one means the ability to perceive a pair or a set of parallel lines in variety of situations as an integral part of a bigger entity and/or an outline of the whole. It is hypothesized that richness in perceptual imagination is the function of (i) figural ideational fluency (DFU), (ii) figural spontaneous flexibility (DFC), (iii) figural transformation (DFT) originality and (iv) figural implication (DFI).

7 For details see Supra, p. 319.
2. This test has been developed on the pattern of Torrance's Parallel Lines Test.

3. Description and Rationale:

This test is parallel to the circle Elaboration test. It consists of 40 pairs of parallel lines of 2 cm. length each, and 1.8 cm. distance between them. The stimuli in this test are open figures and provide higher probability for the involvement of figural imagination than the Circle Elaboration test. The pairs of parallel lines are selected so as to:

(i) make the parallel lines a base in objects known to the subjects,

(ii) make the parallel lines as an integral part of bigger units known to the subjects,

(iii) provide greater participation of imagination in developing figures/pictures, and

(iv) provide opportunities for synthesizing few parallel lines to result in better and complex whole.
The number of stimuli, parallel lines in increased so as to motivate the subjects to work as a high rate. This helps in reducing the rigidity of the conscious mind and thus provide better opportunities for the manifestation of sub-conscious mind.

4. Reliability Coefficient:

50, 75 and 75 test booklets were selected from VI, VIII and X grades respectively and were scored by two raters according to the storing key. The average inter-rater reliability coefficient for the ideational fluency, the spontaneous flexibility, the originality, and the elaboration were .98, .92, .89 and .71 respectively.

5. Time Limit: 20 minutes.

6. Criteria for judgment and scoring system for the Parallel Lines Test

   (1) Criteria for judgment:

For assessing "Free Play of Imagination" through figural media, three following criteria are set up:

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8 For Details see Supra pp. 320.
(a) Relevance
(b) Production of varied and unique objects and/or pictures with details.

(a) Relevance:

A figural entity (object, picture, design etc.) constructed by using at least a pair of parallel lines as a base for or a part of the entity is considered a relevant response. The products which were irrelevantly related to a pair of parallel lines are considered irrelevant. For example, sketching a unrelated scenery between the parallel lines, utilizing only one line of the pair, and constructing a meaningless picture or any other entity are considered irrelevant responses and therefore they are rejected. The relevant responses such as alphabets, digits, flag, purse, tree and railway wagons were considered suitable to measure the various aspects of divergent thinking ability through figural medium.

(b) Production of varied and unique objects/and/or pictures with details:

The production of varied entities with details is assumed to be the function of imagination
to a great extent. The items which were represented objects as they are found in surroundings may be considered more a function of memory than that of imagination. But the addition of uncommon details even to such objects may require imagination. As the purpose of this test is to measure the involvement of divergent thinking abilities, the relevant and unrepeated responses are considered suitable for assessing their involvement.

(2) Scoring System:

The Parallel lines test is scored for the ideational fluency, the spontaneous flexibility, the originality and the elaboration.

(i) Figural ideational fluency (DFU)

Every relevant and non-repeated response is considered to be the production of ideational fluency. One unit is given one score for ideational fluency, and thus the total number of appropriate figural responses is considered a total ideational fluency score. The subjects who were at hand in drawing sketches and were not suffering by any inhibition, could produce large number of figural unit. On the other hand, the subjects having handicap of drawing
sketches and having certain emotional blocks find difficult to produce figural units at a high rate. The subjects who concentrate more on adding details to the produced units score less on the ideational fluency. Therefore, there are every chance to reflect individual differences in producing figural unit. The fluency factor contribute to the total variance in the manifestation of the divergent thinking ability.

(ii) Figural Spontaneous flexibility (DFC)

This ability manifests in shifting the frames of reference in producing figural entities. Precisely speaking, the productions belonging to different classes reflect this ability. A subject sketching English alphabets such as M, N, H and W in his four responses will be considered rigid (in flexible) in comparison to another subject producing M, flag, tree and purse. It is so because the former shift no class in producing the four figural units whereas the latter makes four shifts (maximum). A scoring key is prepared determining the classes of objects and is used for scoring purposes. The production of a class, is given one score and the total number of classes determined the flexibility score for each subject.
In this scheme, there is a probability that a subject gets 20 scores on ideational fluency but only one score on flexibility and the other subject gets 20 scores on ideational fluency and the same score on the flexibility. Thus, the spontaneous flexibility accounts for a sizable variance in divergent thinking ability.

(iii) Divergent Production of Figural Transformation (DFT) - originality:

The originality of responses is calculated on the basis of frequency of responses. A scoring key assigning differential originality weights: 0, 1, 2, 3 is prepared on the basis of selected sample. The relevant and non-repeated responses are assigned originality weights according to the scoring key. The sum of these scores determined the originality score of every subject. There was always a possibility that a subject may produce responses all having zero originality weights, thus receiving zero originality score on the whole test. Another subject may receive different originality scores: 0, 1, 2, 3 on all the responses getting a high originality score. Similarly, most of the subjects are expected to
receive different scores on this dimension and hence the originality accounts for a sizable variability in divergent thinking ability as a whole.

(iv) Divergent Production of Figural Implication (DFI) - Elaboration:

This ability is considered to manifest in adding details to units of production. The details may be added by using dots, curves, shades and colours. One score is assigned to every new detail. A subject may devote all the time in adding details only to two or three entities without producing any new item where as another subject may add no details to any of the produced units. The former will get a high score on 'Elaboration' where as the latter one will receive zero. Therefore the elaboration ability should be considered another dimension of divergent thinking ability accounting for a sizable variance in the latter.

UTILITY TEST

1. HYPOTHESIS

This test aims at measuring the ability to use the physical environment in a variety of ways.
The physical environment here is limited to the objects of daily use. It is hypothesized that the production of various novel uses of objects measures (i) the ideational fluency (DMU), (ii) the spontaneous flexibility (DMC), (iii) the originality (DMT).

2. This test is developed on the pattern of Guilford's Utility Test used in his battery of tests of creative thinking.

3. DESCRIPTION AND RATIONALE

The test consists of 8 objects of daily use such as button, newspaper, wheel, and the examinee is required to produce as many ways as possible. Such objects are chosen because every individual uses them so often that their properties concerning shape, size, colour and texture becomes part and parcel of every body's knowledge. The images and the percepts indicative of their properties and use become ingredient of individual's life. Whenever an individual thinks of any such object he applies little of reasoning. Moreover, the examinee feels at home while responding to such items. The use of less familiar objects as
items of this test would have put more weightage on memory and reasoning. Involvement of individual's personality would have also been less in case of less familiar objects.

The instructions of this test read as follows:

(i) You have to write as many uses of given objects as possible;

(ii) You should write down an use how-soever strange it may be; and

(iii) you should write down varying uses of every object.

(iv) Illustration given below will make the purpose more clear (Nearly fifteen uses of pencil are demonstrated)

(v) There is no time limit, however you have to complete the test as soon as possible.

These directions prepare the examinee to react imaginatively to the items. As soon as the subject reads an item, the image of the object appears in the sub-conscious region. It is
associated by different images, percepts, attitudes and feelings that indicate past experiences with the object. How novel and numerous are the associates of the image depends upon the rich experiences with the object and free functioning of the sub-conscious region. The associates may represent the various shades of uses of a frame of reference, and also of different frames of reference. Many of the uses may be novel as well. Not all these responses cannot be produced by every subject.

An examinee may produce banal responses, few in number, and belonging to one or two categories only. Such an examinee may have either poor motivation or low degree of creative ability or both. Another examinee may produce banal uses, large in number but belonging to few classes. The examinee tends to exhibit syllogistic thinking. Still another examinee may produce large number of uses but belonging to sufficiently large number of different classes. This production may be due to the ideational fluency and the spontaneous flexibility only. A fourth type of examinee may produce large number of responses, most of them representing different classes. A few of them may be novel as well. Thus the production of different
uses of common objects of the physical environment is considered the function of (i) the ideational fluency, (ii) the spontaneous flexibility and (iii) the originality.

4. RELIABILITY COEFFICIENT

The reliability coefficient is calculated by using Rulon's formula. The values of the coefficient in case of the ideational fluency are .953, .953, and .914 for VI (N = 221), VIII (N = 129) and C (N = 91) respectively; the coefficient in case of flexibility are .889, .846, .809 for grades VI, VIII and X respectively, and in case of originality the coefficient are .912, .842, .905 for grades VI, VIII and X respectively.

5. TIME LIMIT : 30 minutes

6. CRITERIA FOR JUDGMENT AND SCORING SYSTEM OF UTILITY TEST

(1) Criteria for Judgment:

To judge the suitability of a response the following criteria are set up:

(i) Relevance

(ii) Frames of references

(iii) Uncommonness
(i) **Relevance**: 

A relevant response is defined as the one which is based on the inherent potentialities of the object, the potentialities may be determined by its chemical, physical properties or cultural values. The banal uses do not inculcate any thought and hence are bracketed with in appropriate responses. For example, 'a Pencil' is used to write or draw a line is so obvious a response that it cannot provoke any aspect of creative tendency. It is simply a matter of recall.

(ii) **Frames of reference**: 

An exhaustive list of categories of each object is prepared on the basis of responses given by three hundred students. The possibility of adding a new category is always there if any response does not fall in the established categories. The number of shifts of frames of reference or the category produced by the subject is indicative of spontaneous flexibility score.

(2) **Scoring System**: 

Ideational fluency Score: The counting of non-repeated relevant responses is the procedure of calculating the fluency score. The item-wise summation determines the total fluency score.
Spontaneous Flexibility Score: The total number of different categories produced by the subject is the flexibility score. Such score can be added for all the items.

Originality: The tallies against the different categories of uses are marked in order to examine how many times a category is repeated by the subject. The frequencies were converted to percentages. A response falling in a category repeated by 10 per cent or more is given no credit. A response falling in a category repeated by 5 to 9 per cent of the subject is given one credit; by 2 to 4 per cent two scores. The responses falling in categories either repeated by 1 per cent or less or the responses that indicate reflective thinking or distant transformations of the property for use are given three credits. Every response is allotted the originality weight determined by its category. The originality score on an item is an aggregate of 1's, 2's and 3's. The item-wise summation is the total originality score.

The ideational fluency score, the flexibility score, and the originality score determine the level of divergent thinking present in the subject.
REMOTE CONSEQUENCE TEST

1. HYPOTHESIS

This test aims at measuring the ability to penetrate or draw remote consequences from unusual events. The events as far as possible are hypothetical and imaginary so that the creative imagination can play maximum role in arriving at the remote consequences. However, many immediate consequences may be produced in the beginning. It is hypothesized that the production of immediate consequences and remote consequences is the function of the ideational fluency (DMU) and the originality (DMT).

2. This test has been developed on the pattern of Guilford's 'Consequences' test used in his battery of creative thinking.

3. DESCRIPTION AND RATIONALE

This test consists of five hypothetical and unusual events as items. The item like "what would happen, if man grows wings," provide sufficient opportunity for the expression of creative imagination. The events depicting the real situations are avoided simply to minimize the effect of day to day experience and role of conscious reasoning. The
role of the rigidities of conscious and unconscious
mind both is avoided because the examinee has to
leave himself in imaginary world where the creative
imagination get full opportunity to participate in
the production.

The instructions of the test read as follows:

(i) Some unusual, unbelievable and impossible
events are given below

(ii) you take the events true for a while and
think of the various consequences

(iii) you have to produce as many consequences
as possible of each event.

(iv) Donot hesitate to report, however strange
the consequence may be.

(v) "What would happen if people no longer needed
or wanted sleep."

Twelve consequences are given.

(vi) There is no time limit, however you have to
finish the test as early as possible.

The test was not time bound. because it was
considered that the full sentence open ended responses
require sufficient time. The time inhibits the flow
of responses.
These instructions prepare the examinee to react to the given events imaginatively. As he reads an event, its idea takes the shape of a pole. The elements of the creative unconscious tend to rush towards the pole in the sub-conscious region. In short period of time, when ideas rush from all sides, the conscious region gets little opportunity to impose its way of tackling things. The stuff of creative unconscious gets full freedom in the autonomous sub-conscious region to dissociate and re-unite again and again until the responses as demanded by the events are available. In case of normal examinees the activities of sub-conscious mind are performed quickly and smoothly. The deep rooted elements of the personality and the creative unconscious are involved more in producing remote consequences whereas day to day experiences and conscious reasoning are manifested in "Obvious" consequences.

The "obvious" and "remote" consequences become the production of ideational fluency (DMU) and originality (DMT) respectively.

4. **TIME LIMIT**: Approximately 30 minutes.
5. COEFFICIENT OF RELIABILITY

The reliability coefficient is calculated by using Rulon's formula. The values of the coefficient are .837, .728 and .600 for grades VI (N = 100), VIII (N = 131) and X (N = 181) respectively in case ideational fluency: .824, .854 and .872 for grade VI (N = 100), VIII (N = 135) and X (N = 181) respectively in case of originality.

6. CRITERIA FOR JUDGMENT AND SCORING SYSTEM FOR THE REMOTE CONSEQUENCES TEST:

(1) Criteria for judgment:

For "Free Play of Imagination" three distinct criteria are set up:

(i) Relevance
(ii) Remoteness
(iii) Complexity.

(i) Relevance: A consequence judged relevant to the situation is given one score for ideational fluency. Relevance implies relatedness, or inherent connection between the situation given and the response received. This relationship between the stimulus and the response is considered
primary/essential even for assessing originality in responses. Too obvious responses like "People would fly" for item 3, which would have been taken for granted, are scored for ideational fluency only because they don't involve much of imaginative thinking.

(ii) Remoteness: A response judged to be relevant is examined for remoteness. If the relevant and non-repeated response involves more imaginative thinking, then the responses of the first category, it is given one score for originality.

(iii) Complexity: This criterion required thinking of responses which could take into consideration more than one, or many, aspects of the situations. In other words, the consequences that are quite far reaching in implications, and far-sighted are judged as "Remote complex". Remote complex consequences are regarded superior in quality and still a step further in imaginative thinking, because they require deeper imagination power. All those responses which satisfied the first two criteria; relevance and remoteness and are judged also as complex in nature, are given two scores.
Some of the examples of the responses judged and scored on the basis of the above mentioned three criteria are:

**Item No. 1** What would happen if a whole a bored in the earth?

<table>
<thead>
<tr>
<th>Responses</th>
<th>Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Geologist will study different types of soil in the earth.</td>
<td>Ideational fluency: 1</td>
<td></td>
</tr>
<tr>
<td>2. Short railway tracks will connect two cities on opposite sides of the glob. Remote quikes</td>
<td>Ideational fluency: 1</td>
<td>Originality: 1</td>
</tr>
<tr>
<td>3. Earth/may not occur at all</td>
<td>Ideational fluency: 1</td>
<td>Originality: 2</td>
</tr>
</tbody>
</table>

**Item No. 3** What would happen if human-beings grew wings?

<table>
<thead>
<tr>
<th>Responses</th>
<th>Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Traffic problems would ease</td>
<td>Ideational fluency: 1</td>
<td></td>
</tr>
<tr>
<td>2. &quot;Easy international communication&quot;</td>
<td>Ideational fluency: 1</td>
<td>Originality: 1</td>
</tr>
</tbody>
</table>
3. 'Design of building construction will undergo a major change.'

(2) Scoring System:

The method of scoring is given below:

A scoring system is developed in which responses of all the examinees were classified in the immediate consequences, remote consequences, and complex consequences categories.

(i) Ideational fluency score:

All the relevant and non-repeated responses whether simple or complex are scored for ideational fluency, one score is assigned to each relevant response. The total of these scores is a measure of ideational fluency.

(ii) Originality:

All the responses, judged as simple remote, are assigned one score each for originality. The responses judged as 'Complex remote' are given two scores each on this trait. All the originality
scores are summed up to obtain the measure of originality.

**PLOT TITLES TEST**

1. **HYPOTHESIS**

   This test aims at measuring the ability to produce clever and non-clever titles of certain story plots. The plots are simple in expression and style and contain the elements of humour and satire. The production of clever responses requires the interpretation of a single event in a variety of ways. It is hypothesized that the production of numerous non-clever and clever titles of such story plots measures the ideational fluency (DMU) and the originality (DMT).

2. This test has been developed on the pattern of Guilford's Plot titles test. Two items are borrowed from Mrs. S. Zaidi's Plot Title test.

3. **DESCRIPTION AND RATIONALE**

   The test consists of 5 story plots, and the examinees are required to give as many titles for each plot as they can.
The following considerations guided the choice of the story plots, which are selected from about 7, short simple stories of this type.

(1) They should present a complete, comprehensible unit leading to a climax, along with brevity in expression, in order to minimize boredom and monotony.

(II) They should satisfy children of adolescent taste in content, along with simplicity in expression to avoid disinterest.

(III) They should contain elements of humour and satire, to keep up their interest in the task performed.

(IV) They should be simple in expression and style, to minimize variance due to language factor.

The instructions of this test read as follows:

(1) You are given five plots of stories. Each one as a complete unit.

(II) The title is missing in each of these stories. You have to read each plot carefully and write as many suitable titles as you can in the space provided above the plot.
(iii) there is no restriction of time, however, you try to complete the whole test within thirty minutes approximately.

The subject were advised to complete the task approximately within 30 minutes because it is a group test, and other tests are also be administered on the same group. No illustration, is given simply to leave the subject's imagination free to give title on one phase or the other or to include all the phases of the story.

As the subject reads the plot of a story, comprehension ability is involved in understanding the central idea inherent in the plot. The individual variations are there in understanding the idea. Some of the subjects may attach to one or the other aspect of the story plot such that all the titles will be limited to that/those aspects. There may be some individuals who take the plot on its face value whereas some others may transform the ideas expressed in the plot so as to reach the central idea. Since in each of the story, humour, satir and certain other similar elements are present in every story, a normal subject can react humorously to the plot. The images, ideas and other stuff of the creative unconscious may creep in the
sub-conscious region which is in the autonomous state. The stuff from the conscious mind in the form of day-to-day experiences may also appear in the region. Constant dissociation and reunion among the elements take place till many aspects of the story plots are represented. Since the subject's mind is in a hurry to produce the responses at high rate, many immature and prelogical ideas and associations may appear in the conscious region through semantic content. Thus, there is every possibility to produce some clever and others non-clever responses in the form of titles of the story plots. Some of the non-clever titles may be "A man and his wife", "A soldier and his donkey", "A University Professor", "Who he was", and "A foolish driver". These titles require no transformation of ideas given in the story plots, therefore, they are considered non-clever responses. Such responses are considered measures of ideational fluency. Some other clever titles such as --

Item I - "My Quiet wife"
Item II - "An abnormal Donkey"

Item V - "An optimistic Driver"

are assumed to be the measure of originality since
many transformations may occur in ideas appeared in the story-plots. Thus, the test is considered to measure (i) Ideational fluency (DMU) and (ii) originality (DMT).

6. **Reliability Coefficient**

   The reliability coefficient are calculated by Rulon's formula .86, .67, .77 reliability coefficients are obtained for grade VI (N = 82), VII (N = 146) and X (N = 174) respectively; in case of ideational fluency; and .89, .82 and .75 coefficients are obtained for grades VI, VIII and X respectively in case of originality.

5. **Time Limit**: No time limit (Approximately 30 minutes were taken by the students.

6. The Criteria for judgment and scoring system for Plot titles test:

   (1) **Criteria for Judgment**

   The plot titles test which consisted of 5 story plots, and purports to measure ideational fluency and originality, are scored on this basis
of the following criteria. Two criteria are set up for the purpose. The first criterion is devised to assess 'ideational fluency'. The second criterion is the measure of cleverness which in turn has been assumed to be a measure of originality in this study. The two criteria are -

(1) Appropriateness

(2) Cleverness.

(1) Appropriateness:

An appropriate response is defined as one which is based on the theme, tone, plot, idea, and the total symbolism of the given plots. The titles should be intrinsically in keeping with and related to all or some of these aspects of the given plot. All the appropriate titles of a story plot are given one credit each. Too obvious titles are not given any credit. For example, titles like "The treatment of a Doctor" - item 1 -- and "The Donkey" - Item 2 -- donot give any imagination whatsoever; so they are bracketed with unrelated titles like "What is the matter now" or "Ear" -- item 1.

A few examples of appropriate titles are:
Item I : Successful operation
Item II : Enemy's fear
Item III : Talkative Professor
Item IV : The two cunnings.
Item V : Single Shoe

A response not fulfilling the primary criteria is not given any credit at all.

(2) Cleverness :

Cleverness in responses on the P.T.T. demands imaginative richness and ability to transform ideas cognized from the plot. This enables the subject to interpret a single phenomenon in a variety of ways by transforming one idea or the other so that they are related to stories; humorous and other shrouded constructs. This criterion discriminates between 'just appropriate' responses -- which express a limited range of imagination -- and clever responses -- which indicate transformations of ideas. Responses satisfying the second criterion are given below:

Item I : Unfortunate husband/wives
Item II : Changing fortune
Item III: Time a great determining factor/English dear.
Item IV : Conflict
Item V: A Prescription of happiness.

The clever responses are further classified into two categories judging them as more clever and as most clever.

(2) Scoring System

Idealational Fluency Score

Each of the appropriate and clever responses assigned one score for idealational fluency. The sum of the score on all the items gave the total idealational fluency score.

Originality

The more clever response is given one credit and the most clever one is given a credit of two scores. The sum of the clever responses on all the 5 story plots is considered a measure of originality.
A CRITICAL APPRAISAL OF THE TEST USED AT THE FIRST STAGE

It may be recalled that some of the tests used at the first stage are found less valid due to their insignificant loadings on the extracted common factors. This observation led up to think of dropping certain tests from the final stage and to modify some others for this stage. The author feels need to re-evaluate the tests so that final decision may be taken about them. First the tests which have little opportunity to be used in the final study are re-evaluated. After the evaluation the test that have the potentiality to be used in the modified form in the final study are reviewed.

A - TESTS THAT HAVE BEEN REJECTED

1. THE WORD ASSOCIATION TEST

In this test, the item 'गोला' (Gola), 'स्केल' (scale), 'लेटर' (letter), 'पानी' (water) are substantives which have less number of synonyms than verbs and adjectives. The reason is that the verbs and adjectives can be used as substantives but the latter cannot be used as verbs
and adjectives. Therefore the noun words seem less rich in potentiality for this test. This character-
istics of the stimuli has resulted in the poor production of synonyms. It is also an observation that most of the examinees have to make much conscious efforts in producing synonyms. It leads us to think that probably the sub-conscious region has not acted freely because of predominance of the conscious region. Thus the poor potentiality of the substantives and less involvement of free sub-conscious region were the two main causes of inadequate performance on this test. The insignificant loadings on common factors, in addition to the above observation, may be considered adequate grounds to drop the word Association test from the final study.

2. THE NUMBER ASSOCIATION TEST

Items on this test too, put heavy premium on memory because uncommon cultural usages of digits can be produced only on the basis of conscious efforts. Many other correlates are produced by applying rules of arithmetic mechanically. For instance, the correlates of the word "three", 1/3 (one third) 2/3 (two third), 4 (three fourth)
3 x 3 (three times), 3rd (third) seem the production of the operations. The correlates of the word "two", are also produced on the same pattern. Both the operations that is the recall of memorized words and the applications of arithmetical operations, occurred at the conscious level. It blocked to a great extent, the involvement of free and quick functioning of the sub-conscious mind. The other observations which are considered true in case of the Word Association test, are also applicable to the Number Association test.

The two tests are used to measure the associational fluency and the spontaneous flexibility; but the correlation between the two set of measures of the associational fluency is not high. The same observation is applicable to the spontaneous flexibility. It may mean that both the tests have greater specific variances than their respective common variances. Therefore the Number Association test is also dropped along with the Word Association test.

3. CATEGORY-WISE THING LISTING TEST

Items of this test require the production of objects that satisfy class characteristics. For
instances, the responses to items "gas with odor" and "liquid that burns" can be given on the basis of memory. The examinees cannot produce responses out of their imagination. Therefore the test is dropped.

4. **MAKE-UP MATHEMATICAL RELATIONS TASK**

This test is found most difficult by the examinees of all the three grades. The reason probably is that the examinees learn mathematical symbols and operations by repeating them again and again. Performing the operations may help the subjects to solve diversified problems of daily life. The gifted subjects can solve uncommon problems too. Thus, the uses of the operations and symbols both reflect in diversified problems, but the predominance of mechanical use of these operations prohibits the free and divergent play of the two. The minds of the subjects are gradually trained to reach mechanically.

In reality, the production of the divergent symbolic systems in the present task, requires the free and divergent play of symbols and operations. The latter actions of the mind are not allowed to occur because of the adverse effect of mechanical
training commonly prevalent in our mathematics education in schools. The poor production of responses on this test could be assigned only to specific variance of the test and not to variance common to other tests. Therefore this test is dropped from the final study.

5. THE CIRCLE ELABORATION TEST

The 40 items of this test are completed within 20 minutes time. Repeated occurrence of the same circle lessened the curiosity of the examinees to respond to variety of questions. This feature of the test also failed in maintaining interest of the examinees throughout the testing period. Rather the examinees felt bored in dealing with the same stimulus, 40 times. Another observation is that the examinees as they were directed by instructions were in hurry to complete all the 40 items. The figural ideational fluency could get full opportunity to act but smooth flow of the figural elaboration was blocked to a great extent. The stimuli inherited less potentiality to stimulate figural spontaneous flexibility as well because of the constant size of the circle. The examinees produced those objects and figures only which had small circles as their integral parts. They could not think easily of
objects having big circles as their integral parts. Thus the monotony of form and the monotony of function become the two major bases of producing numerous but common and un-elaborated figures. The author still feels that circle is an effective stimuli to measure figural imagination. But he thinks of bringing variety in the size of circles and reducing their number so that both the types of monotony can be reduced. It is this reason that the "Circle test" having the desired changes, is selected for the second stage.

6 THE PARALLEL LINES TEST

This test is parallel form of the circle Elaboration test. Therefore whatever observations are made about the circle elaboration test; they all are applicable to the parallel lines test as well. It was decided to replace this test by another one whose stimuli are of varying nature and form. The Figure Drawing test satisfies the requirements and therefore it is selected for the second stage. It is assumed that variation in the nature of stimuli will maintain interest of the examinees throughout the testing period.
B. TESTS TO BE MODIFIED FOR THE SECOND STAGE

1. SENTENCE CONSTRUCTION TEST

In the first section of the test, an examinee has to write a two-word sentence for each of the three items. Afterwards, he has to produce as many sentences as possible such that each word starts with letters specified by his first sentence. This pattern is different from the one kept in other items. The examinees found the deviation of the pattern confusing. Further, in order to bring homogeneity in the whole pattern, the author feels the need to specify first letters of the two-word sentences.

Another observation is that the examinee has to shift his thinking from the construction of two-word sentences to four-word sentences abruptly. There seems to be a big gap in the complexity of items in the two parts. In order to bring regularity in the increment of item complexity, it was considered necessary to introduce another section where three-word sentences will be constructed by the examinees. This addition may enable the examinees to deal with items of increasing complexity, smoothly.
The responses of the subjects to the part II, were very poor and due to this, the Sentence Construction Test did not explain much common variance. However, the test is retained for the second stage of the study after the above mentioned improvements are made. It is hoped that the test would become more discriminating.

2. CONTROLLED ASSOCIATION TEST

Under the word Association test, the substantives are found to have less number of synonyms than the verbs and adjectives. Due to this reason, the performance of the examinees was found to be poor on the noun words. Therefore a need is felt to replace noun words by adjectives. It is hoped that the examinees will produce more number of responses on the items.

Therefore, the revised form does not contain the three substantives i.e., Corn, book and birth. New items which are adjectives (strong, independent, mad, and hard - working) are added to the final form. Thus in the revised form each item is an adjective.
3. **SIMILARITIES TEST**

In the items of this test, the examinee has to produce similarities between a pair of objects. All the examinees of X grade produced large number of responses in respect to the items: Curtain and rug, rat and cat, potato and carrot. Therefore, the three items do not seem to have discriminative power at least at X grade level. The other four items which are found challenging to the subjects and also discriminative are: Scale and clock, Building and Army, Man and Plant, River and Time. These items are to be retained because 3 out of 7 i.e., nearly 40 per cent of the original items are rejected; therefore, it was considered necessary to include one or two new items in the test.

A new item "Bird and Aeroplane" is included in the test because it can catch the imagination of X grade students. Therefore, the test is retained after making the above mentioned changes.

4. **UTILITY TEST**

Three items namely news paper, bamboo and wheel are found to have effective discriminative power. But the "Jute-ropes" is confusing to many of the subjects because the specification of a
particular type of rope inhibits the free flow of ideas (uses). Probably the examinee is to think many times whether the use he is thinking of, is the use of every rope or that of the specified one. There are examinees who do not make any distinction between "jute-rope" and the "ordinary-one". Therefore, it is suggested that "rope" can replace the "jute rope".

The item "metal wire" is considered less potential because many of its uses resembled with "rope". Therefore, the examinee could not produce much different responses to this item. Moreover, the examinees did not know much about the metal wires. Almost the same observation is true about "basket". The items "button", and "tin container" are found so common and easy that all type of students produced large number of responses. Therefore, the items have poor discriminative power. Thus, it was decided that "button", "tin container", "basket", "metal wire" be dropped and the jute-rope be replaced by ordinary rope.

Because many items were rejected, the investigator felt the need to include some more such
items that have satisfactory discriminating power. The "brick" is borrowed from Guilford's utility test. The items were borrowed from the standardized test because their discriminating power is well established. Thus, instead of items in the original form, the revised form of the test contains such new items.

5. REMOTE CONSEQUENCES TEST

First four items of the original form of the test are found well discriminative and interesting to the subjects of X grade. The fifth item, "what would happen if people loose the power of speaking", donot appear interesting to the subjects because they did not produce as many responses as they did on other items. For instances, many of the subjects suggested to use other media of expression leaving aside the vocal one. The item could provoke only a few responses.

Therefore, the author feels the need to replace the item. In the revised form, the item is replaced by another item "what would happen if man in could be/visible at will?" The item seems relatively
more interesting because it can allow the manifestation of the unconscious mind easily.

6. **PLOT TITLES TEST**

The fifth plot which depicts optimistic thinking of an engine driver, could not attract the attention of the adolescents because of his naive faith. This kind of faith is lacking in modern generation, and, therefore, the subjects could not produce large number of titles on this item. Thus it was found that it has little discriminative value. The item is dropped out and, therefore, the revised form contains 4 plots only.
PART - II

TEST USED AT THE FINAL STAGE

WORD FLUENCY TEST
(Revised form)

1. Rationale and Description of the Test:

This test aims at measuring word fluency by motivating the examinee to generate words as letter patterns, from memory storage to fulfill certain class requirements.

The instructions may be read from the test booklet attached in the Appendix 'B'.

The fifth instruction "An examinee is advised not to produce proper nouns", provides a major deviation from the first form. The change is brought to check the production of words having no percepts or traces in the memory storage. Because it is felt that many proper nouns whose sensibility could be doubted were cooked, then and there, and were produced by the examinees in the first form of this

9 For details see Supra, Part I, p. 273
test. However, this check will stimulate the examinees to cognize word meanings of the letter-patterns that appear in the sub-conscious region in response to a stimulus. Thus, the involvement of the ideational fluency (DMU) in this form of the test will be greater than the first form.

The test consists of three sections, each one containing two items. Each item is provided in Hindi and English versions both. The nature of items remains the same as in the first form.

2. **Time Limits**: 10 minutes.

3. **Reliability Coefficient**:

   The reliability coefficient calculated by Rulam's formula is .85 for X (N = 150) grade.

4. **Criteria for judging and scoring the correct responses on the word fluency test**.

   The criteria and the scoring procedures remain unchanged.

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10 For details see Supra, Part I, p. 276.
1. Rationale and Description:

This test aims at measuring the capacity to produce various semantic systems under specified conditions. It is hypothesized that the production of different semantic systems is the function of expressive fluency.

This test consists of three sections in the main body. In Section I, initial letters for two sentences are specified in each of the two items and the subject is directed to produce as many semantic systems as possible in response to each item. In this revised form, the initial letters are given in Hindi as well in English. A subject has a freedom to select one symbolic system (language) for attempting all the items of the test. The time limit for this section is 6 minutes.

The Section II, consists two items along with specific instructions. In each item, three words sentences with specified initial letters are to be produced. The examinee is to produce as many

For details, see Supra - Part I, PP. 283-84.
three-word sentences as possible within 10 minutes.

Similarly, the section III, consists two items along with specific instructions and time limit of 12 minutes. In each item, the subject has to produce four-word sentences under the imposed conditions.

2. **Total time**: 32 minutes

3. **Reliability Coefficient**

   The reliability coefficient is calculated by Rulon's formula and is found to be .760 for X grade.

4. **Criteria for judgment and scoring system of the Sentence Construction Test**

   In the scoring system of three word sentences in section II, the maximum score for each sentence is $1\frac{1}{2}$ ($\frac{1}{2} + \frac{1}{2} + \frac{1}{2}$). The scoring criteria for all other situations remain the same as in the first form.

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12 For details see supra, Part I, p. 286

13 Ibid. Part I, p. 287
CONTROlLED ASSOCIATION TEST

(Revised form)

1. Rationale and Description of the Test:

This test aims at measuring the ability to produce multiple correlates of each of the given words in limited time. The relation is similarity in meaning. Therefore, the correlates determine the different shades of a given frame of reference. The production of these correlates is hypothesized as a function of the associational fluency.  

The revised form/the test includes nearly all the instructions of the first form. The one illustration in which synonyms of "earth" were demonstrated is dropped out and, therefore, the present form is left with one illustration only. The illustration now demonstrates the correlates of the word "little" in two versions - English and Hindi. Items in the main body of the test are given in both the versions and the examinees are required to select any one they like.

14 For details see, Supra Part I, P. 301.
In the first form, 3 noun words are found to have less number of correlates than the adjectives in part II of this form. The reason is that the substantives in various contexts are replaced by quality and action but not vice-versa. Therefore the number of substantives (nouns) is meager in a language and over and above they create neither spatial rhythm nor temporal one. Therefore all the three substantives (Corn), (Book) and (Cloth) are dropped and four new adjectives are included in the revised form of the test. The adjective tastee is replaced by more potential adjective "strong". Thus the revised form contains 8 adjectives in all.

2. Total Time: 30 minutes.

3. Reliability Coefficient:

The reliability coefficient is calculated by using Rulan’s formula. The value of the coefficient is .84 for X (N = 200) grade.

4. Criteria for judgment and scoring system of the Controlled Association Test.

5. For details see, Supra Part I, P. 303.
5. **Scoring System**

New Scoring key is developed in the same way as it was developed for the first form. The relevant responses are mostly judged on the basis of this key. However, if a new word appeared, it is judged for its suitability by consulting experts in Hindi. One score is assigned to each relevant response. The total score is considered a measure of the associational fluency (DMR).

**NUMBER RULES TEST**

(Revised form)

1. **Rationale and Description of the Test**

This test aims at measuring the ability to produce divergent symbolic relations between any two given digits as symbols. It is hypothesized that the production of symbolic relations is the function of the associational fluency (DSR).\(^\text{16}\)

The test contains four items. The third item of the original form is dropped out simply to

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\(^{16}\) For details, see Section I, (Supra) p. 295.
reduce the length of the test. The rest of the details of the test remain as they were in the first form.

2. **Reliability Coefficient**

The reliability coefficient calculated by split-half (odd-even) method is found .846 for X grade (N = 200).

3. **Scoring System**

The test is scored for the associational fluency only on the basis of operations. The scoring weights remain the same as in the first form.

**Similarities test (revised form)**

1. **Rationale and description of the test**

This test aims at measuring the ability to cognize numerous similarities between two verbally specified objects. The production of similarities requires cognition of multiple analogies between the two objects and transforming each analogy as a class of characteristics. It is hypothesized that the production of numerous and unique class characteristics is the function of the ideational fluency and originality.

15 For details see Section I, PP. 304, 306.
The test starts with the general instructions to motivate the examinee to produce common characteristics of each pair of objects. The revised form contains only one illustration of "apple and orange" to clarify the directions.

There is major change in items of the revised form. Only four items: Scale and clock, Building and Army, Man and Plant, River and Time, are retained from the first form. Another new item - Bird and Aero Plane is included in this form. Thus the total number of items in this test is five. The three items - Curtain and rug, rate and cat, carrot and potato - are found easy by Xth grade examinees and therefore are dropped.

2. **Total time**: 30 minutes.

3. **Reliability Coefficient**

   The reliability coefficient is calculated by split-half (odd-even) method. The values of the coefficient are .90 and .92 for the ideational fluency and the originality in Xth grade (N = 200).

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16 For details see Supra Section I, P. 306

5. Scoring System:

A separate scoring is developed for assigning originality weights to responses of different categories. The scoring weights 0, 1, 2, 3 remain the same as in the first form. The relevant responses are assigned one score each for the ideational fluency.

Utility Test (revised form)

1. Hypothesis

The hypothesis remains the same as in the first form.

2. Description and rationale

This form of the utility test contains 5 objects (as items) of daily use. Three items: News paper, bamboo, wheel are selected from the first form because they were found effective in discriminating between mediocre and normal subjects.

17 For details see Supra Section I, pp. 307, 308.
18 For details see Supra Section I, p. 335
The fourth item "rope" is the modification of the seventh item "Jute rope" in the first form. It is changed because the specification of the particular type of rope blocks the flow of ideas (uses). Probably the examinee is to think many times, whether the use he is thinking of, is the use of every rope or that of the specified one. There are examinees who donot make any distinction between jute rope and the ordinary one.

A new item "brick" is borrowed from Guilford's utility test. The item is chosen primarily because the students of Xth grade are well familiar with this object. Second, it has worked in the standardized test. The item "metal wire" of the original form is dropped out because most of the examinees are found less familiar with the object and moreover another item "rope" of a similar nature is already selected for the test. The item is found less discriminating. Almost the same observation is true about "basket", another item of the original form. The items "button" and "tin container" are found so common and easy that all the examinees of Xth grade faired equally well on these item. Therefore, they are also found less discriminating. The two items are deleted.
There is no major change in the instructions except that (1) the 40 minutes times is specified, and (ii) the examinees are given the option to select either English or Hindi medium of expression. The first change is brought to make the administration of group tests of this battery more effective. The second change is brought to provide the facility to the students of public schools of opting any media of their choice.

The production of numerous and novel uses of these objects in the function of the ideational fluency and the originality.

3. Reliability Coefficient

The reliability coefficient is calculated by Rulon's formula. The values of the coefficient are .914, .920, .905 for the ideational fluency, the spontaneous flexibility, the originality respectively for Xth grade students (N = 200).

4. Criteria of judgment and scoring system for the utility test.

(1) Criteria for judgment - The responses are judged on the basis of (1) relevance,

19 For details see Supra Section I, p. 336
(ii) Scoring System:

(a) Ideation fluency - The non-repeated relevant response is assigned one score for the ideational fluency.

(b) Spontaneous flexibility - The responses, of all the examinees to the new items, are classified in non-overlapping categories. It serves as key. The number of classes produced by an examinee is the spontaneous flexibility score.

(b) Originality - Differential weights are assigned to different classes on the basis of their relative in-frequency. The sum of the weights assigned to different uses according to the scoring key determine the originality score.

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20 For details see Supra Section I, p. 339.
Plot Titles test (revised form)

1. **Hypothesis** - The hypothesis remains the same as in the first form.

2. **Description and rationale**

   This form of the Plot titles test consists of 4 story plots, asking the examinees to give as many titles for each plot as they can do. All these plots are selected from the first form of this test. All these plots discriminated well between mediacres and gifted. The fifth item of the first form, which depicts optimistic thinking of an engine driver is deleted because it could not motivate the adolescent examinees of any category: mediacre, normal, gifted. All the examinees produce a few titles only although no time is imposed for completing the test. Therefore, the item is considered to have poor discriminating power.

   There is no change in the instructions except that the examinees are advised to opt any media of expression i.e., either Hindi or English. This change is brought to provide facilities to the examinees.

21 For details see Supra Section I, p. 349.
examinees coming from public schools. The directions motivate the examinee to produce titles taking into consideration the tone, theme, plot, idea and the total symbolism of the given plots. The clever responses and the non-clever/numerous in quantity are produced by the examinees. The production is considered a function of the ideational fluency, and the originality. 22

3. **Reliability coefficient**

The reliability coefficient is calculated by Rulon's formula. The values of the coefficient are .770 and .750 for the ideational fluency and originality for the Xth grade students (N = 200).

4. **Criteria of judgment and scoring system for the plot titles test.**

(a) **Criteria of judgment.** The criteria set up for judging the adequacy of the responses are (i) appropriateness, 23 (ii) cleaverness.

(b) **Scoring system.** The key is used to judge the non-clever and the clever responses and assigning marks. 24

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22 For details see Supra Section I, p. 349
23 For details see Supra Section I, p. 350
24 For details see Supra Section I, p. 353
Remote Consequences Test (Revised form)

1. Hypothesis:

The hypothesis remains the same as in the first form.

2. Description and rationale

This test consists of 5 hypothetical, unusual, unbelievable events, trends or situations. Four of these items are selected from the first form. The fifth item "What would happen if people loose the power of speaking" of the first form is replaced by "what would happen if man could become invisible at will?".

There is no major change in the instructions except that (1) the working time is restricted to 40 minutes, and (2) the items are provided in Hindi and English version both and the examinees are given the option to chose any language. The first change is brought to make the administration of the group tests easy. The second change is made to provide facilities to the examinees of public schools to opt the language they like.

For details see Supra Section I, p. 342
3. **Reliability Coefficient**:

The reliability coefficient is calculated by Rulon's formula. The values of the coefficient are .710 and .872 for ideational fluency and originality respectively (when N = 200) for the Xth grade.


   (1) **Criteria of judgment** - The criteria set up for judging the adequacy of the responses are (i) relevance, (ii) remoteness, and (iii) complexity.

   (2) **Scoring system** - The scoring key developed at the first stage of this study is enriched by including the responses to first four items of 200 examinees from the sample. The scoring is used for assigning marks for the ideational fluency and the originality on the first four items.

   A similar key is developed for the new item. The differential weights are assigned to responses of three categories (immediate, remote, remote complex). The sum of the scores on all the
Immediate consequences determines the ideational fluency score whereas in all the remaining responses belonging to the two categories, originality score was calculated. Remote consequences were awarded a score of 1 for originality on every response; and 2 for remote complex.

The Circle Test

1. **Hypothesis**

This test was originally used to measure originality, imagination and sense of beauty but in the present study it is used for measuring (i) ideational fluency (DFU), (ii) spontaneous flexibility (DFC), (iii) originality (DFT), and (iv) figural implication (DFI).

2. This test is borrowed from Mrs. Zaidi's battery of tests of creative thinking. It is a revised and improved version of Turrance's circle test.

3. **Description and rationale**

This test consists of 20 circles. These circles are of two different sizes. In one set, the diameter of each circle is 3 cms. whereas in
the other, its size is 2 cms. The circles of small and big sizes are placed randomly in different cells. The circles of the two different sizes are selected to provide better stimuli for placing more premium on the figural spontaneous flexibility than on the ideational fluency. Because in the Torrance Circle Elaboration test, having all the 40 circles of the same size, the examinees manifest the ideational fluency more than any other ability. In many cases, the spontaneous flexibility and the ideational fluency came out to the same extent. The production of the originality and elaboration remain poor. The circles of different sizes definitely direct examinee's thinking to refer to different contexts. The random arrangement of the two types of circles has significantly contributed to the same cause.

The other criteria to select circle are that the circular shapes occur most commonly in every physical environment. The associates of circle image get better opportunity to become a part and parcel of unconscious mind. Thus the circle as a stimulus proves rich opportunities for the involvement of creative unconscious in the production of figural imagination.

26 For details see Supra Section I - p. 319.
4. Time limit is 30 minutes.

No illustration is provided to keep the thinking of the examinees free. These instructions motivate the examinee to think imaginatively in response to the items. The various percepts, images, ideas, attitudes and feelings that had associated with the percepts of circle, move to the sub-conscious region. These elements unite, dissociate again and again in number of ways till some configurations of unique nature are obtained. The autonomous sub-conscious mind sends these configurations to the conscious mind which expresses through figural medium. Since drawing skill is also involved in this performance, the skill may account for some portion of the variance. The production of pictures and scenarios is the function of the divergent thinking abilities.

5. Reliability Coefficient. The reliability coefficient is calculated by Rulon's formula. The values of the coefficient in case of the ideational fluency, the spontaneous flexibility, the originality and the elaboration are .970, .900, .830 and .740 respectively for Xth grade students (N = 200).

6. Criteria of judgment and Scoring System for the Circle Test.
(i) Criteria of judgment - For assessing "Free play of imagination" through figural medium, the two criteria set up are (a) relevance, and (b) production of varied and unique circle objects and/or pictures with details.

(ii) Scoring System - The circle test is scored for the ideational fluency, the spontaneous flexibility, the originality and the elaboration. A separate scoring key is developed for this test.

Figure Drawing Test

1. Hypothesis

Barron used this test to measure originality. In an study, Zaidi used it to measure "sense of beauty", "imaginative richness", and "originality". In this study, it is hypothesized that perceptual imagination is the function of (i) figural ideational fluency, (ii) figural spontaneous flexibility, (iii) figural originality, and (iv) figural elaboration. The originality and the elaboration abilities may get better opportunities for manifestation than the former two.

27 For details see Supra Section I, p. 323
28 For details see Supra Section I, P. 324.
2. This test is borrowed from Zaidi's battery of creative thinking. It is used in the two studies successfully and proved to be highly discriminative.

3. Description and Rationale

This test consists of 12 geometrical simple and open figures. Each figure is very much different from others in the set. No figure except one or two can be integral part of the same ordinary object. Moreover, these sections which contain these geometrical figures cannot be perceived so often as circles and pairs of parallel lines. Therefore, much conscious thinking is to be applied at the initial stage.

The items are selected in order to bring variety and novelty in stimuli so that the examinee may rarely repeat a class of object. The variation in stimuli may sustain the interest of divergent thinking adolescents. As the examinee cannot decide quickly what he is going to draw, the stimuli provide situation to tolerate ambiguity for a while. The creative imagination may find its way in producing meaningful objects.

The instructions of the test read as follows:
(i) Twelve different sketches are given below.

(ii) You draw figures on the basis of each stimuli separately. The stimulus should become an integral part of what you draw.

4. Time limit is 30 minutes.

No illustration is given simply to leave the imagination free. As the examinee perceives an stimuli, no end picture is viewed easily. Therefore, he makes conscious efforts to add lines, and curves to each stimulus. Gradually, the imagination finds its way. Many ideas, percepts, images, attitudes, and feelings find their way from creative unconscious to the conscious mind via the sub-conscious region. Gradually, the figure in hand becomes clearer and nearly complete. These stimuli provide better situation for the expression of figural originality and elaboration in comparison to the ideational fluency and the spontaneous flexibility. It is felt so because every examinee tends to produce twelve different figures. Therefore, every examinee tends to receive 12 scores on the ideational fluency and the spontaneous flexibility. But there is sufficient scope for the manifestation of individual differences with respect to the originality and the elaboration.
5. Reliability Coefficient.

The reliability coefficient are calculated by Rulon's formula. The values of the coefficient for the ideational fluency, the spontaneous flexibility, the originality and the elaboration are .980, .890, .850 and .760 respectively for Xth grade ($N = 200$).

6. Criteria of judgment and scoring system for the Figure Drawing test.

(1) Criteria of judgment. The following criteria are set up for the purpose.

(1) Relevance

(ii) Production of varied and unique objects and/or pictures with details.

(1) Relevance: A figural entity (object, picture, design) drawn by using the given stimulus figures as a base for or a part of the entity is considered a relevant response. The product which is irrelevantly related to a stimulus figure is considered irrelevant. For example, sketching a basket between the parallel lines, is meaningless
because the pair is not an integral part of the basket. The figure is rejected. The relevant responses such as horns of a bull, snake, half moon, flag, breast of a lady are considered responses and are scored for the divergent thinking abilities.

(ii) Production of varied and unique objects and/or pictures with details:

The items which represents objects as they are found in surroundings may be considered more a function of memory than that of imagination. But the addition of uncommon details even to such objects may require imagination. As the purpose of this test is to measure the expression of divergent thinking abilities, the relevant responses are considered valid. The variety of the products is judged on the basis of the class it represents. The originality in the productions of each stimulus is calculated by measuring relative in-frequency of occurrence of response in the whole sample of 540 subjects. The responses whose occurrence is 10 p.c. and above, between 5 p.c. and 9 p.c., between 2 p.c. and 4 p.c.; and 1 p.c. and below are allotted 0, 1, 2 and 3 originality weights respectively.
The weights determine their relative uniqueness. Thus a scoring system is developed for judging originality in various responses.

(2) Scoring System:

This test is scored for the ideational fluency, the spontaneous flexibility, the originality and the elaboration.

(i) Ideational fluency: Each relevant response is allotted one mark for the ideational fluency. The maximum possible score is 12.

(ii) Spontaneous flexibility. One mark is allotted for one of object or figure. The number of classes produced is the spontaneous flexibility score.

(iii) Originality. The responses are assessed for originality on the basis of scoring key developed for the purpose. Differential weights are assigned to different responses. The sum of the weights on all the items is the measure of the originality.

(iv) Elaboration: One mark is allotted for one idea added to the basic figure. The lines, dots which give a look of an object are not allotted any score. The more added ideas to the basic figure
is the score on elaboration on the item. The total of such scores gives the scores on elaboration.

**Multiple Grouping Test**

1. **Hypothesis**

   This test aims at measuring the ability to produce a number of different properties that sets of objects have in common and to show this by adding in turn other object sets. It is hypothesized that the production of different class properties is the function of the spontaneous flexibility (DMC).

2. This test is developed on the pattern of Guilford's Multiple Grouping Test devised to measure DMC factor for his S.I. model.

3. **Description and rationale:**

   This test consists of 5 items. Each item contains the names of 8 objects written in Hindi and English versions both. The objects are selected on the basis of the following criteria.

   (i) Examinees are well familiar with the objects.

   (ii) Examinees are well familiar with the symbol of each object.
(iii) Objects as sets and sub-sets in each item have many common characteristics.

The instructions of the test:

The instructions are given on the front page of test attached in the appendix.

The instructions motivate an examinee to form different object sets and sub-sets for each item. As the examinee reads the names of common nouns, images, percepts and feelings which represent his concept of the class appear in the sub-conscious mind. Various associates of these images which represent the examinee's experiences with the object also move with them. The flow is from creative unconscious to the sub-conscious region. Thus the associates of these common nouns, assemble together in the sub-conscious mind where they remain in the floating state; form and deform different configurations tentively. The sets of images which fulfil the demands of the test may bring a sort of satisfaction unknowingly. Then, they are thrown to the conscious region. The class characteristics appear in verbal form. The generated object sets
and sub-sets themselves represent class characteristic. Therefore the production of different object sets and sub-sets is considered as a function of the spontaneous flexibility (DMC).

4. Reliability Coefficient:

The reliability coefficient is calculated by Rulon's formula. The value of the coefficient is .970 for Xth grade student (N = 200).

5. Criteria of judgment and scoring system for the Multiple Grouping test.

(i) Criteria of judgment -

The following criteria are set up for the purpose:

(a) Relevance

(b) Object sets and sub-sets represent a class characteristic.

(a) Relevance: A set is considered relevant if (i) it is formed on the basis of characteristics of objects and not those of symbols, (ii) every member of the set shares the characteristic possessed by the remaining ones, (iii) set contains at least two objects, and (iv) the class characteristic is written along with the sets.
(b) Object sets and sub-sets represent a class characteristic:

The objects in a set should possess a class-characteristic. If any member which does not fall in the line of other elements of a set for one characteristic or the other, the set is rejected. The different object sets formed under different characteristics are considered production of the spontaneous flexibility.

(ii) Scoring System:

A scoring key is developed by the author in order to bring objectivity in the scoring system. All possible object sets and sub-sets are included in the key. If any new set under any item appeared during scoring, it is included in the key. One mark is allotted for one class characteristic. The total number of classes is the total score on the spontaneous flexibility.

Word Grouping Test

1. Hypothesis:

This test aims at measuring the ability to produce a number of different properties that sets
of letters have in common and to show this by adding
in turn other letter sets. It is hypothesized that
this production of different class properties is
the function of the spontaneous flexibility (DSS).

2. This test is developed on the pattern of
Guilford's Name Grouping test devised to measure
DSC factor for the S.I. model.

3. Description and rationale:

The test consists 4 items. Each item
contains 9 words of English. The words are
selected on the basis of the following criteria;

(i) Some words are similar with respect to syllables.
(ii) Some words start with a common letter.
(iii) Some words end with a common letter.
(iv) Some words have a specified letter or a
group of letters.
(v) Some words produce a common sound.
(vi) Some words have double letters.
(vii) Some words have consonents whereas others have
vowels only.
(viii) Words can be read and pronounced by examinees.

There are certain other similar characteristics as well. It is certain that no word is
selected on the basis of its meaning and characteristics of the object it symbolizes. Items contain English words only because it is a test of symbolic content and not that of semantic content. Thus, the ability to perceive the characteristics of symbols is the only basis for performance in this test.

The words so selected are grouped under different items such that a large number of sets and sub-sets can be devised on each item.

The instructions are given on the front page of the test attached in the appendix.

The directions motivate and prepares the examinee to answer the items efficiently. As the examinee reads all the words of an item, he sees the words from their structure point of view. He perceives the letters and sets of letters. The percepts of different letters or sets of letters that have common properties form different configurations in the sub-conscious mind. They are sent to the conscious mind which expresses them through letters. Since the names of the class characteristics are written in words, ability pertaining to semantic content may be involved. The production of different
sets and sub-sets is considered the function of the spontaneous flexibility (DSC).

4. Reliability Coefficient:

The reliability coefficient calculated by Rulien's formula is .980, for grade Xth (N = 200).

5. Criteria of judgment and scoring system for the Word Grouping Test:

(1) Criteria of judgment: The following criteria are set up for the purpose.

(i) Relevance

(ii) Letter sets and sub-sets representing a class characteristic.

(i) Relevance: A set is considered relevant if (i) it is formed on the basis of characteristics of letters and not those of objects, (ii) every member of the set shares the characteristic possessed by the remaining ones, (iii) set contains at least two symbols, and (iv) the characteristics is written along with the set.

(ii) Letter sets and sub-sets representing a class characteristic:

The symbols in a set should possess a class characteristic. Any member which donot fall in line
with other elements of set for one characteristics or the other, the set is rejected. The different letter sets formed under different characteristics are considered production of the spontaneous flexibility.

(2) Scoring System:

A scoring key is developed by the author in order to bring objectivity in the scoring system. All possible letter sets and sub-sets are included in the key, however, if new set is produced by the examinees, it is included in the scoring key. One mark is allotted for one class characteristic. The total number of classes is the total score on the spontaneous flexibility (DSC).

**Figural Similarities Test**

1. **Hypothesis:**

This test aims at measuring the ability to produce a number of different properties that sets of figures have in common and to show this by adding in turn other figural sets. It is hypothesized
that this production of different class properties is the function of the spontaneous flexibility (DFC).

2. This test is devised on the pattern of Guilford's Figural Similarities Test developed to establish the DFC factor for his S.I. model.

3. Description and rationale:

This test consists of 4 items. Each item consists of 7 figures. The figures are drawn to satisfy the following criteria.

1. Some sets of figures are of the same geometrical form.
2. Some sets of figures are shaded.
3. Some sets of figures are dotted.
4. Some sets of figures have knobs.
5. Some sets of figures are closed whereas others are open.
6. Two or three figures are inscribed in some figures.

Similar many other properties are incorporated in sets of figures. Then figures are grouped in form of items such that many sub-sets can be
formed in each group. Many figures were simple. The figures can easily be perceived.

The instructions are given on the front page of the test, attached in the Appendix.

The instructions motivate and prepare the examinee to deal with the items efficiently. As he observes the sketches in an item, he develops percepts of these sketches. The percepts are formed of complete figures, a part or some parts of figures. The elements of these percepts move easily in the sub-conscious region. They unite, dissociate and re-unite again and again till such sets of percepts are formed which can form one class. The class properties are associated with the configurations. The configuration with the class property are sent to the conscious mind which expresses the clusters in sets of figures. Thus an ability pertaining to semantic content may come in the production of figure sets are communicated by number (symbols), there, a part of the variance of this test may be shared by symbolic content. The production of figural classes is the function of the spontaneous flexibility (DFC).
4. Reliability Coefficient:

The reliability coefficient calculated by Rulon's formula is .890 for grade X (N = 200).

5. Criteria of judgment and scoring system for the Figural Similarities Test.

(i) The following criteria are set up for the purpose.

i. Relevance

ii. Figure sets and sub-sets represent a class property.

(i) Relevance: A set is considered relevant if
(a) it is formed on the basis of characteristics of figures, (b) every member of the set shares the characteristic possessed by the remaining ones,
(c) set contains at least three figures; and
(d) the characteristics is expressed with the set.

(ii) Figure sets and sub-sets representing a class property:

The figures in a set should possess a class property. If any member which does not fall in line with other elements of set for one characteristic of the other, the set is rejected. The different figure
sets formed under different characteristics are considered production of the spontaneous flexibility.

(2) Scoring system:

A scoring key is developed by the author in order to bring objectivity in the scoring system. All possible figure sets and sub-sets are included in the key. However, if any new correct set is given by the examinees, it is included in the key. One mark is allotted for one class characteristic. The total number of classes is the total score on the spontaneous flexibility (DFC).

Autonomy Dependence Scale - (A.D.Scale)

1. Hypothesis:

This questionnaire assumes dependence to reflect in the tendency to -

(1) follow others
(ii) be dependent on others in matters of choices or preferences,
(iii) be advised and guided by others,
(iv) leave the major issues of life on authority like religion, law, parents and society,
(v) feel secure when supported, advised or guided by others,
(vi) Avoid responsibilities of free thinking, self decision, independent thinking and action.

And the other end of the continuum i.e., "autonomy" is assumed to reflect in

(i) the desire to get free,
(ii) shaking of restraint,
(iii) breaking out of confinement,
(iv) resisting coercion and restriction,
(v) avoiding or quitting activities prescribed by domineering impulse, and
(vi) defying conventions.

2. This questionnaire is developed on the basis of definition of autonomy and pattern of test items devised by Murry.

3. **Description and rationale:**

This test consists of 36 items. 21 statements are direct narration of the "autonomy" -- the positive end of the continuum and the remaining 15 items reflect the expression of "dependency" - the negative end of the continuum. Every item can be used both ways because the examinee has to show his agreement or disagreement with the statement and then he has to rate the intensity of attitude. A few items
demonstrating the two ends are given below:

(1) Some item descriptive of autonomy:

(1) I try to celebrate festivals in non-traditional way.

(2) It irritates me to participate in the formal celebration of death. Therefore, if such an occasion arises, I would, at least, not join the celebration.

(3) I do not respect the rules and regulations of the school that curtail the independence of free expression.

(2) Some items descriptive of dependency:

(1) For progress, it is essential to adopt the ways and means given by elders.

(2) There can be nothing better than the notes of teacher to get through the examination successfully.

(3) One should leave the matter concerning marriage to elders because they understand them better than we do.

The instructions of the test read as follows:

(1) Thirty two statements on different aspects of
human behaviour are given below. Different persons take them differently.

(2) If you agree with the statement, then, explore the degree of agreement. For ordinary agreement put " +1 " and for more than ordinary agreement put " +2 " in the printed bracket.

(3) If you disagree with the statement, then, explore the degree of disagreement. For ordinary disagreement put " -1 " and for more than ordinary disagreement put " -2 " in the bracket.

(4) If you are unable to take any decision, put " 0 " in the bracket.

The creative thinker who evaluates situations as well as his own behaviour primarily depends upon the intrinsic merits of the situations. In this process, he is guided by his own perceptions and feelings instead of external authority. Therefore if some authority intends to curtail his freedom to think and act independently in a situation, he expresses his desire to break the restraint. The authority may be society, religion, political party, a greatman but for him they all are secondary; the primary authority is his rational self. Contrary to this a person with dependence has to depend upon
external authority because he cannot seek inspirations from his own self.

4. **Reliability Coefficient**:

The reliability coefficient calculated by Split-half method corrected by Spearman Brown Prophecy formula is .850.

5. **Scoring system**:

The scoring system of the questionnaire is done in accordance with the following scheme.

<table>
<thead>
<tr>
<th>Response</th>
<th>Credit</th>
<th>Response</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>+2</td>
<td>+2</td>
<td>-2</td>
<td>-1</td>
</tr>
<tr>
<td>+1</td>
<td>+1</td>
<td>-2</td>
<td>-2</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Thus the total credit of a subject was algebraic sum of all the scores.

**Conformity Scale** (C. Scale)

1. **Hypothesis**:

This questionnaire assumes conformity to reflect in -
1. behaviour determined by conventions, mores and superstitions prevalent in the society,

ii. externalization of moral values,

iii. yielding to group pressures and techniques, and

iv. rigidity in behaviour.

The other end of traits if dichotomized define non-conformity.

2. This questionnaire is borrowed from Mrs. S. Zaidi's battery of tests and questionnaires devised to study personality of creative persons.

3. Description and rationale

This questionnaire consists of two parts. Part I consists of 31 simple statements each to be rated at five point scale. The positive end is assigned "+1" and "+2" for expressing the degree of agreement and the negative is assigned "-1" or "-2" for disagreement. Zero is award for indefiniteness. In part II, each statement out of 11 is followed by three options. The examinee has to select one of the three for expressing his agreement by placing 0, +1, +2 in the bracket.
These 42 items are related to (i) religion, (ii) education, (iii) marriage, and (iv) interpersonal relationships. The four dimensions cover practically all the significant aspects in which the conformity can be manifested. The situations cover personal dimensions like marriage and religion, and also social ones like education and interpersonal relations. The analysis of items is given below. This analysis demonstrates the construct validity.

(i) Conventionality, items: 1, 2, 4, 15, 16, 23, 24, 25, and 28.

(ii) Non-conformity, items: 14, 29.

(iii) Yielding, items: 3, 4, 9, 10, 17, 1*, 2*, 5*, 6*, 10*, 11*.

(iv) Independence, Items: 21, 22

(v) Regidity, Items: 5, 6, 11, 20, 26, 27, 30, 31

(vi) Flexibility, Items: 18, 19

(vii) Externalization, Items: 7, 12, 13, 3*, 4*, 7*, 8*, 9*

'*' is placed on items of the Part II.
Each item can be answered in agreement as well as in disagreement. Thus dichotomy in each trait is tested in the system. No necessity is felt to frame equal number of items on both the ends of a trait; internalization is totally neglected. In part II, seventh item which intends to measure the degree of externalization, is framed for boys and girls separately. An examinee has to select the alternative according to his sex.

The instructions for Part I and Part II are given separately in the test itself attached in the appendix.

A clear understanding of the instructions motivates and prepares the examinee to answer the questions of the scale. The rationale behind the traits may be comprehended by understanding the theoretical frame. These behavioural manifestation of conformity are due to the lack of motivation in self-actualization. Lack of social security may lead a step ahead. Whenever, a person growing conformity in his behaviour move away the convention, he may have been threatened, for deprived of the primary social ties and sense of belongingness. Therefore he develops a tendency to be abided by conventions.
and traditions of the society. He tends to develop
the idea that group is always superior in all
respects than an individual. Therefore, he has to
submit his self to the wishes of the group. The
fear prohibits him to take risks in life. Therefore,
he tends to adopt well established and verified
tracks. He develops rigidity in his behaviour.
Contrary to this, a non-confirmist is self critical
and is guided by the intrinsic merits of the
situation. He tends to behave independently
instead of yielding. Whatever short comings he finds
in himself, he tries to remove them. The dichotomies
are constantly reduced. He develops the inter­
nalized moral values instead of external ones.

4. Reliability Coefficient:

The reliability coefficient calculated by
Split - half method corrected by Spearman-Brown
Prophecy formula is .770 .

5. Scoring System:

The scoring of the questionnaire is done
in accordance with the following scheme.
Ego-Strength Scale-(E.S.Scale)

1. Hypothesis:

Ego strength is the ability to build up a consistent and enduring set of moral values within the personality. The weak-strong ego continuum will represent from complete inability to strong ability to build up a set of suitable moral values. It is the weakness of ego, apparently, that makes it necessary for the individual to seek some organisation and coordinating agency outside of himself for moral decisions. The strong ego enables an individual to interpret the thoughts and acts of another only through his own experiences and consequently does not depend upon outside agency for moral decisions.

It is hypothesized that the ego weakness manifest in -
(i)  rigid adherence to conventional and middle class values (conventionalism)

(ii) submission, uncritical attitude toward idealized moral authorities of the ingroup (authoritarian submission)

(iii) tendency to condemn, reject, and punish people who violate conventional values (Authoritarian aggression).

(iv) Opposition to the subjective and the imaginative (Anti-intraception)

(v) the belief in mystical determination of the individuals' fate and the disposition to think in rigid categories (superstition and stereotyping).

(vi) pre-occupation with dominance - submission, strong-weak, leader-follower dimensions; identification with power figures; over-emphasis upon the conventionalized attributes of the ego; and exaggerated assertion of strength and toughness (Power and toughness).

2. This questionnaire is devised on the pattern of California F-Scale -- a measure of ego strength.
3. Description and rationale

The present questionnaire consists of 29 items. Ten items are picked up from the F-scale and are translated in Hindi. The remaining 19 items are constructed to measure the first six traits given under hypothesis. No items is framed on "Destructive and Cynicism", "projectivity" and "sex" -- the remaining constituents of the Ego-strength in F-scale. These factors are not only outside the experiences of adolescents but are not prominent norms of our society where sex conventionality, for example, takes quite different form. For example the question, "Homosexual are hardly better than criminals and ought to be severely punished" would have not been appreciated by adolescent boys and girls of this class. In the same way, the question "Most people donot realize how much our lives are controlled by plots hatched in secret places", can hardly be comprehended by adolescents.

Some questions, in order to demonstrate the logical validity of items, are given here:

(1) Some items descriptive of conventionalism:
   1. The businessman and manufacturers are much important to society than the artists and professors.
18. Happiness in domestic life can be achieved only when marriage is celebrated according to the tradition and customs of the society.

(ii) Some items descriptive of Authoritarian Submission.

3. Every person should have complete faith in some supernatural power whose will he obeys without question.

11. A child should do a work at every cost if he is asked to do it by his parents or some other elders.

(iii) Some items descriptive of Authoritarian Aggression.

8. What the youth need is strict discipline, rugged determination, and the will to work and fight for family and country.

10. Person insulting our society and country should be punished.

(iv) Item descriptive of Anti-interception.

2. When a person has a problem or worry, it is best for him not to think about it, but to pass time in processions and chitchat with friends.
(v) Item descriptive of superstition and Stereotypy.

19. Science has its place, but there are very important things that can never possibility be understood by the human mind.

(vi) Item descriptive of Power and toughness.

22. No power weakness or difficulty can hold us back if we have enough will power.

Trait wise distribution of items may also help in understanding the construct validity of the questionnaire.

1. Conventionalism, Items: 1, 18
2. Authoritatiran Submission, Items: 2, 3, 5, 6, 9, 11, 27.
5. Superstition and Stereotypy, Items: 7, 8, 15, 19.
The items related to different aspects very in number because more weight is given to those aspects which are related to adolescents everyday experiences; less weightage is given to those aspects which are remotely related to the periphery of their daily experiences.

The instructions may be read from the front page of the questionnaire attached in the Appendix.

As stated earlier, the presence of the above mentioned traits is the weakness of ego which cannot utilize the energies of the creative - unconscious in establishing the individual's command over the environment. Because, it fails in establishing rapport of unconscious world with the world outside, it cannot seek liberty of taking risks for the expression of one's inner self and creative - unconscious. Thus, the ego loses her own resources of developing moral values; it has to depend upon outside authority. It tends to be rigid and tough because it cannot grant concession to the growing personalities. Because of similar
other situations of the ego, the traits given above develop in the behaviour of persons having weak ego.

4. Reliability Coefficient:

The reliability coefficient calculated by Split-half method corrected by Spearman Brown Proghacy formula is .850.

5. Scoring System:

The scoring of the questionnaire is done in accordance with the following scheme.

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<thead>
<tr>
<th>Response</th>
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<tr>
<td>+2</td>
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<tr>
<td>+1</td>
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<td>0</td>
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Thus the total credits of ego - strength of a person was algebraic sum of all the scores.

Dogmatism Scale (D-Scale)

1. Hypothesis

This test depends upon the hypothesis that open mind represents a structural organisation
generally behaving greater differentiation within its disbelief system and greater communication within and between belief and disbelief systems (interdependence), while the closed mind demonstrates less differentiation within its disbelief system and greater isolation within and between belief and disbelief systems.

2. This test is an Hindi adaptation of Rokeach's "D" form of Dogmatism scale. Dr. Hassan of Aligarh University also adapted the 'D' Scale in Hindi version. The present 'D' scale is obtained by including 16 more items in Hassan's adapted version. The 16 items were translated from the Rokeach's 'D' scale simply to cover the traits which are essential for a creative person.

3. Description and rationale:

The following item analysis is done to evaluate the construct validity of the scale. The scale covers the following sub-dimensions.

(i) Item involving the belief-disbelief continuum.

(a) Accentuation of differences between the belief and disbelief system:

Item 1, 2.
(b) Perception of irrelevance: Item 3

(c) Co-existence of contradiction within the belief system: Item 4 - 6.

(d) Relative degree of the differentiation of the belief and disbelief system: Items 7 - 8.

(ii) Items involving central - peripheral dimensions:

(a) Belief regarding thealoneness, isolation, and helplessness of man: Item 9 - 10.

(b) Belief regarding the uncertainty of the future: Items 11 - 15.

(c) Belief regarding the self adequacy - inadequacy: Item 16 - 18.

(d) Self-aggrandizement as a defence against self - inadequacy: Items 19 - 22.

(e) Paranoid outlook: Items 23-25.

(f) Authoritarianism: Item 26-33.

(g) Intolerance: Items 34-40.

(h) Inter-relations among primitive intermediate and peripheral beliefs: Items 41-44.
(iii) Items involving time perspective.

(a) Attitude towards the past, the present, and the future: Item 45

(b) Belief in force as a way to revise the present: Items 46 - 50.

It is revealed that the closedness - openness of mind continuum includes three sub-continuums: (i) belief - disbelief sub-systems, (ii) Central - peripheral continuum, and (iii) time perspective. A closed mind rejects the disbelief sub-system altogether, without any differentiation within the disbelief sub-system, and accepts a belief assumed to depend on irrelevant internal derives and/or arbitrary reinforcements from the external authority. Second, he feels strongly threatened and anxious in given situations because his criteria of judgment is always either external authority or irrelevant internal pressures. Third, he always confirms present actions on the basis of remote future. Contrary to this an open minded individual always tends to evaluate himself objectively and resists irrelevant motivational or reinforcement pressures. He is not threatened in any situation because he judges it on intrinsic merits. He confirms his
prediction about the future on the basis of immediate consequences. Thus closedness - openness continuum is measured through the three continuums.

The instructions of the test read as follows:
(a) Fifty statements on different aspects of personality are given below. The statements have different meaning to different persons.

(b) (i) If you agree with the given statement, then explore the degree of the agreement. For ordinary and more than ordinary agreements put " +1 " and " +2 " marks respectively in the brackets given on the left hand side of the statement.

(ii) If you disagree with the given statement, then explore the degree of the disagreement. For ordinary and more than ordinary disagreements put " -1 " and " -2 " marks respectively in the brackets.

(iii) If you are not able to take any decision about the statement, then, place "0" in the bracket.

4. Reliability Coefficient:

The reliability coefficient calculated by split half method corrected by Spearman Brown Prophecy formula is .82.
5. **Scoring System:**

The scoring of the scale is done in accordance with the following scheme:

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<tbody>
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<tr>
<td>0</td>
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<td>-2</td>
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</table>

Thus the total score indicative of openness of mind was the algebraic sum of all the scores.

**Jalota Group Test of General Mental Ability**

1. **Hypothesis**

This test is used to measure convergent thinking as a general intellectual ability.

2. **Description and rationale**

This test is developed and improved form of the test-work started early by Mr. S.K.D. Pande of Banaras Hindu University in 1951. In the beginning the elements of (i) Vocabulary similars, (ii) Vocabulary opposites (iii) Number Series, (iv) Classification, (v) Best answers (vi) Inferences,
(vii) Analogies were included. It was felt afterwards that the best answers and inferences measure abilities with a good deal of overlap and that vocabulary — similars and opposites have much in common. So ten items for each of them were selected, and twenty items for the other three elements of 'number series', 'classification', and 'analogies' were selected. Total number of items in this test is 100 only.

3. **Time Limit**: 20 minutes.

4. **Scoring System**:

   With the help of the scoring key the correct responses were marked. The total number of correct responses was the total score earned by each student. Then with the help of manual I.Q.'s were found out.

   **Banasthali Vidyapith Socio-Economic Status Scale**

1. **Hypothesis**

   It is hypothesized that socio-economic status of a family is determined by (1) education of parents, (2) Occupation of parents, and (3) Income of parents.
2. This scale is developed by Banasthali Vidyapith College of Education in 1967 on the pattern of Kuppa Swami Socio-economic Status Scale.

3. Description and rationale

Each of the three dimensions i.e., education of parents, their occupation, and their income is to be rated by every subject at seven point scale. Each dimension is described in seven graded stages and the subject is simply to tick off the category applicable to his/her parents.

It is assumed that the education of parents equip them to understand and adjust in their social and physical setting of the environment. They share in the social responsibilities and enjoy privileges and by that they occupy a position in their society. Income and mode of expenditure play very significant role in enabling them to discharge their social responsibility and command respect from the society. In Indian Context, the nature of occupation also influences the position of parents. Medical doctor, Lawyer, Engineer, Civil and Military servants enjoy good respect in the society irrespective of their savings. Thus these factors are supposed to determine the position of parents in the society.
This socio-economic status determines to a great extent, the personality make up, mode of thinking and attitude towards world problems at large.

4. Scoring System

Serial number of a statement ticked off by the subject under a category determines the raw-score on the dimension. Thus the maximum score on this scale is 21 and the minimum one is 3.

5. Reliability Coefficient

Test-retest reliability coefficient of the scale is found to be .980 (N = 300).