CHAPTER 4

MEASUREMENT IN CREATIVITY

BRIEF SURVEY OF CREATIVITY TESTING

4.1 MAJOR AREAS

Creativity research, as indicated by different University of Utah Research Conferences, (Taylor and Barron (237), Taylor (241)) seems to divide itself into following major areas:

1. Theoretical Analysis of Creative Process,
2. Criterion and Prediction Studies,
3. Intellectual, motivational and personality characteristics:
4. Environmental Conditions,
5. Creativity in special fields, and
6. Educational development of creativity.

According to Golann (103), the psychological study of creativity has four emphases : Products, Process, Measurement and Personality. There are three main issues which are of concern: the definition and criteria, the process

viewed temporally and necessary personal and environmental conditions. In the previous chapters considerable attention has been given to different aspects of creativity from the theoretical stand-point. Elaborate literature can be found in the following books: Stein and Heinze (233), Anderson (8), Parnes and Harding (209), Barfon (23), Taylor and Barron (237) Getzels and Jackson (94), Torrance (256), Guilford (123), Taylor (241), and in the articles mainly Guilford (122), Golann (103) and Razik (ed. 214). Research work in India has been reviewed by Raina (215) analytically.

4.2 BRIEF REVIEW OF TESTS

A brief review of available creativity tests will be done in this chapter, as it is of crucial importance for any attempt to construct a test of creative ability. At the end, view-points on the advantages and drawbacks of some of the important tests have been presented. While describing each, name of the test (or battery), operations involved, special names, opinions will be given wherever necessary.

A. Creativity Factor Tests by Guilford and his Associates

(Guilford (117), Hoepfner and Guilford (142) and Guilford (123)).

1. Figural Fluency: Sketches, Make-a-figure and Make-a-mark. Involve production of figural units out of given figural information.

S.I.name: Divergent production of figural units (DFU)

2. Word Fluency: Word fluency, Suffixes If-1, Prefixes If-2 and first and last letters. Involve production of different words with given ending or beginning or both.

S.I.name: Divergent production of symbolic units (DSU).

3. Ideational Fluency: Ideational fluency, Topics If-1, Theme If-2, Thing Categories If-3, Plot Titles (non-clever), consequences (obvious) and Utility (Fluency) based on former Brick Uses. Involve production of ideas relating to broad specified classes.

S.I.name: Divergent Production of Semantic Units (DMU)

4. Associational Fluency: Associational Fluency, Simile Insertions and Controlled Associations. Involve association of ideas fulfilling a condition say synonymity.

S.I.name: Divergent production of semantic relations. (DMR)

5. Expressional Fluency: Expressional Fluency, Simile Interpretation and Word Arrangement. Involve

production of sentences with specified conditions.

S.I.name: Divergent production of Semantic systems.(DMS)

6. Figural Spontaneous Flexibility: Figural Similarities. Involve classification of figures into given categories of figures.

S.I.name: Divergent Production of Figural Classes.(DFC)

7. Symbolic Spontaneous Flexibility: Varied Symbols and Name Grouping. Involve grouping of symbols having the same principle.

S.I.name: Divergent production of symbols Classes. (DSC)

8. Semantic Spontaneous Flexibility: Utility (Flexibility) Test and Alternate Uses (a revision of unusual uses). Involve shifting of idea.

S.I.name: Divergent Production of Semantic Classes. (DMC)

9. Figural Adaptive Flexibility: Match Problems II, III, IV and V and Planning Air Manoeuvres. Involve obeying certain conditions and implementing a required change in a given figural system (Processing figural Information in revised ways).

S.I.name: Divergent Production of Figural Transformation (DFT)

10. Originality (Semantic Adaptive Flexibility): Plot Titles (Clever) Consequences (remote), Symbol Production, Riddles (clever). Involve production of unusual (unknown) or remote or clever ideas.
S.I.name: Divergent Production of Semantic Transformation. (DMT)

11. Figural Elaboration: Decorations, Production of Figural Effects and Figure Production. Involve addition of figural details to a given figural unit.
S.I.name: Divergent Production of Figural Implications. (DFI)

12. Symbolic Elaboration: Limited words and Symbolic Elaboration. Involve manipulation of symbols to produce others using the given ones.
S.I.name: Divergent Production of Symbolic Implications. (DSI)

13. Semantic Elaboration: Planning Elaboration and possible jobs. Involve addition of details of elaborate a given plan oridea.
S.I.name: Divergent Production of Semantic Implications. (DMI)

14. Figural Redefinitions: Concealed Figures (F-I), Hidden Figures, Penetration Camouflage and Hidden Pictures. Involve location of specified

figural items in a complex set.

S.I.name: Convergent Production of Figural Transformation. (NFT).

15. Symbolic Redefinition: Camonflaged words and Word Transformation. Involve rearrangement of letters in order to get the words concealed in a set of different words given.

S.I.name: Convergent Production of Symbolic Transformation. (NST)

16. Semantic Redifinition: Gestalt Transformation, object syntasis and Picture Gestalt. Involve transformation of application of given objects in order to fulfil a specified purposes.

S.I.name: Convergent Production of Semantic Transformation (NET)

17. Sensitivity to Problems: Apparatus Test, seeing Problems, Social Institutions and Seeing Deficiencies. Involve locating problems and possible implications.

S.I.name: Cognition of Semantic Implications. (CMI)

18. Divergent Production of Symbolic Relation (DSR) (A Parallel of Association Fluency): Number Rules and Alternate Additions. Involve arriving at a number using a starting number in different ways.

S.I.name: As above.

19. Divergent Production of Figural Systems (DFS)

(A Parallel of Expressional Fluency) : Making objects. Involves organising visual figural elements into wholes.

S.I.name: As above.

20. Divergent Production of Symbolic System (DSS)

(A Parallel of Expressional Fluency) : Make a code. Involves production of code systems substituting numbers for letters.

S.I.name: As above.

(Note:- Upto S.No. 17, tests listed are for those well-found factors of creativity with 'trade names', 18, 19 and 20 are other parallel divergent production abilities constituting creative thinking).

B. Minnesota Tests of Creative Thinking (Torrance, 256)

Consist of a wide variety of tasks which can be classified into three major categories : Non-verbal Tasks, Verbal Tasks using non-verbal stimuli, and Verbal Tasks using verbal stimuli.

(a) Non-verbal Tasks

(i) Incomplete Figures: Requires the Ss to complete the figures (lines) given by adding lines into

some object or design that no one in the class will think of. Scored for fluency (productivity), originality elaboration and closure (penetration).

(ii) Picture Construction Task: Requires the Ss to think of a picture in which a given shape is an integral part. Two shapes (a triangle and Jelly bean shape) of glued paper will be supplied to them. Responses can be scored for originality, elaboration, sensitivity, communication and activity.

(iii) Circles and Squares: A combination of two separate but similar tasks. One test sheet contains thirty five (1" x 1") squares. The other contains forty two small circles (1" dia.) Ss are required to sketch as many figures of objects as possible, which have circles (or squares) as the main element. Responses can be scored for fluency, flexibility, originality and elaboration.

(iv) Creative Design Task: Requires the subjects to prepare designs using circles and strips. Scoring procedures have not been reported (Torrance, 256).

Note: Incomplete figures, picture construction and circles and squares have been used in India by different researchers. (Raina, 215).

(b) Verbal Tasks Using Non-verbal Stimuli

(i) Ask and Guess Test: Presents a picturesuch as Tom, the Piper's son. Ss are asked to think of all questions they can about what they can see in the picture. In the second stage, they are asked to make guesses. In the third stage, they are asked to give possible consequences of the action depicted. Protocols are scored for fluency and adequacy.

(ii) Product Improvement Tasks: Includes four different tasks - a toy nurse kit, a friction fire truck, a stuffed small toy dog, and a stuffed small toy monkey. Ss are requiredto suggest improvements for the toys so that boys and girls find more fun playing with them. Responses are scored for fluency, flexibility, originality, inventiveness and the like.

(c) Verbal Tasks Using Verbal Stimuli:

Excepting that the responses are scored for two or more of the factors like fluency, flexibility, originality, elaboration or sensitivity to problems simultaneously in some tasks, the tests, viz., Unusual Uses, Impossibilities Consequences, Situations, Common Problems and Improvements are analogous or similar to those evolved by Guilford and his associates. Hence tests which are seemingly different from the above have been described below.

1. Just Suppose Test: Similar to 'consequences'. Only difference is the presentation of a picture depicting improbable statement. Responses are scored for fluency, flexibility and originality.

2. Mother Hubbard Problem: Ss. are asked to think of all the things Mother Hubbard could have done when she found that there were no bones in the cupboard. Responses were scored for fluency and quality.

3. Cow Jumping Problem: A companion for Mother Hubbard problem.

4. Imaginative Stories: Ss. are asked to write stories on interesting titles suggesting strange situations. Responses are scored for organisation, sensitivity, originality, psychological insight and richness.

(d) Other Tasks

Creative Activities Check-lists: These check-lists include various activities, experiences, hobbies and interests of children. 'Things Done on Your Own' is one such which includes activities crossing through areas like language, art, sciences, social studies, and other fields including some hobbies.

C. Wallach and Kogan's Test of Creativity
(Wallach and Kogan, 274)

The test consists of five 'games': three verbal and two nonverbal. The three verbal 'games' are Instances, Alternate Uses and Similarities. The two non-verbal 'games' are pattern meanings and line meanings. In all 'games' responses are made verbally by the S and examiner notes down. Instances require the S to give different objects with specified quality or property. Alternate uses requires the S to give different uses of a specified object. Similarities requires the S to tell in how many different ways two specified objects are alike. Pattern meanings consists of nine simple patterns drawn on different cards of 4" x 6" size. S is to tell what different things that a complete drawing represents. Line meanings differs from Pattern Meanings in that each card presents single open-ended line drawn to form different shapes. From each of the five games, two scores : number of relevant responses and number of unique responses have been derived. Tests are to be individually administered.

D. Remote Associates Test (Mednick and Mednick:(200)
Mednick and Mednick in Taylor (ed. 241))

Consists of thirty items. Each item is a set of three unrelated words. The subject is asked to give one word which canrelate the other three. Ss are given four examples.

The set of words: white, out and cat are related to 'house'. If the subject gives 'house' as the answer, it is correct because it makes meaning out of all the three words given: 'white-house', 'out-house' and 'house-cat'. Number of items completed correctly gives the S's score.

E. A.C.Test of Creative Ability:

(Harris and Simberg: 132)

Consists of five parts: (i) Possible Situations which requires the S to list as many possible consequences as he can. This yields quantity and uniqueness score. (ii) General reasoning ability test which requires the S to list as many reasons as possible to explain five unusual and not necessarily true statements. Scores same as in (i) above. (iii) Sensitivity to problems test which requiresthe S to list improvements for five common appliances. This gives uniqueness score only. (iv) A practical judgement test which requires the S to give least expensive and least time-consuming solutions to five problem situations. This yields a quality score. (v) Originality test which requires the S to give as many possible uses as possible for five common objects. This yields quantity and uniqueness score.

F. Barron Welsh Art Scle: (Barron; 18) in Parnes and Harding (ed. 209), and Barron (23).

Contains abstract line drawings prepared in ink on

3" x 5" cards. Subjects are required to show preference or lack of preference for each of the cards. Drawings varied in structural complexity as well as ambiguity. "The simplest forms were the straight line, the circle, and the triangle; Complex polygons presented somewhat obvious principle of construction, and arrangements of curves a still less obvious principle. At the other pole from the simple geometrical figures were drawings which appeared to be children scrawls or totally unarranged scribbles . . ." (Barron, in Parnes and Harding. eds., 209).

Note: In a strict sense this scale or its parent Welsh Figure Preference Test are not tests. But the test gives value to nature of stimulus figures which the creatives like or dislike. From the point of view of its importance in this regard, the test has been included here.

G. The Rorschach, The H.I.T. and the T.A.T.

(Barron: 121; Sixth MMYB, P.49).

The Rorschach O^{+} score is a count of the number of original responses given by the subject to the ten Rorschach blots. TAT protocols have also been rated for originality. H.I.T. responses have been found to differentiate between creatives and non-creatives. All the three employ what is generally known as projective technique.

Eron (10) (MHYB Sixth, p. 49) while reviewing the Rorschach Technique writes -

> The subject's verbal productions (in responses to Rorschach*) can be placed into such categories as compulsive thinking, disorganised thinking, or creative thinking, poverty of ideas or fluency; confabulation or clarify; rigidity or flexibility: perplexity or straight forwardness; rejection or compliance . . . . . .

Thatford (246) (MHYB, Sixth p. 443) describes the first factor obtained in the factor analysis of HIT scores as defined by 'movement, integration, human, barrier and popular'. "High scores here are thought to be related to well organised ideational activity, good imaginative capacity, well differentiated ego boundaries, and awareness of conventional concepts . . . . . ."

H. <u>The Creative Design Test</u> (Miles D.T. (203)

Consists of five problems. Solutions judged for fluency, flexibility and originality. No construct validity was obtained from teacher-ratings.

1. <u>Flanagan's Test of Ingenuity</u> (Flanagan (77), Lohnes (~~12~~) (181)

Required subjects to provide solutions to problems in a specified wording, the beginning and end letters of each word being given. Some distractors are also given.

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* The Investigator's words.

Besides the ones mentioned above, there are other tests which have been reported as differentiating creatives from non-creatives. Examples are Make-a-pun (Kerlins, 163), Cursive and Angular Shapes (Zambito, 294), Test of Original and Creative Thinking (Flanagan and Gallup (79), Cree Questionnaire (Thurstone and Mellinger, 252), Purdue Creativity Test (Law-she and Harris, 174). Guilford (123) and Torrance (256) also mention some tests (evolved by others) which have been found to be useful in identifying individuals with creative thinking ability.

A Critique

Wallach and Kogan (274, p. 11) while reviewing the tests questioned the assumption that there are two cognitive domains which can be labelled as intelligence and creativity. They also remarked "rapidity or speed of production is a part of his (Guilford's) characterisation of creativity domain, and indeed is inextricably connected with it by virtue of the fact that the various assessment devices in question are timed; a feature not unique, incidentally, to the work of Guilford group. . . " Referring to speed as a test control, Guilford (123; p. 443) writes, "There are some abilities for which speed is an essential condition, for example, tests of fluency, in which speed of recall, or retrieval of information, is an essential aspect of aptitude". Secondly, according to Guilford, time limitation is a condition that is needed to control the individuals

from devising strategies 'that involve operations that change the nature of the test'. In other words, speed is an important experimental control where other methods of control are less effective. Another point is about the age of the subjects. Wallach and Kogan worked with young children. With young children giving liberal time is justified. Guilford's second contention that it is much needed method of experimental control where other methods are less effective is also, hence, justified. Hence the apparent difference of opinion expressed by Wallach and Kogan simply is a matter for understanding. Thinking very broadly, human life itself is a speeded test; such individual within limits of his potentialities and resources tries to proceed as rapidly a possible, tries to gain much out of nature.

J.A.Keats (165) (in Sixth MMYB, pp. 847-8) commenting on Guilford's fluency tests that no other validity data except that of factorial validity are available, and reliability is to be improved by lengthening the tests suggests," ..... the only way to be certain that the extended tests had the desired factor structure would be to carry out a fresh factor study. This study could also include criterion measures so that validity data for the particular situation could be obtained."

Most of the studies by Guilford group are directed towards the analytic study of human intellect rather than predictive validity of the instrument (Albert S.Thomson; 249, Sixth MMYB, p. 849). Commenting on the consequences tests, Goldine C. Gleser (102) (Sixth MMYB, p. 851) agrees with reviewers quoted above on the necessity of other types of validity. He further pointed a test measuring several aspects of creativity or originality may have more predictive validity than a pure test'. Practically every reviewer has stressed the need for some index of interscorer agreement for the tests they reviewed.

Torrance regarded that creative potential should be recognised as it exists and not in a fragmented way by factors using factor tests. Measuring by factors might be giving a dilated view of personality of the creative.

One of the solid drawbacks of Torrance's tests had been the lack of analytic proof for the validity of multiple scores derived from same set of responses. Viewing the individual responses from different angles in search of factor scores is no doubt a novelty in scoring, and has come as a by-product of creativity research. Torrance gets the credit of utilising this procedure to a maximum extent. However, a factor - analytic proof is pending.

On the basis of his study describing the original persons (using different measures), Barron (21) recognises that all the measures he used are of free response type. In the discussion, he concedes to the finding 'Originality', then, flourishes where suppression is at minimum and where some measures of disintegration is tolerable in the interest s of a final higher level of integration'. Barron-Welsh Art Scale, though it cannot be said to be a test in the strict sense utilises the principle of liking for complexity and tolerance for ambiguity. These studies and instruments by Barron and Welsh and others may be regarded as intermediaries leading to such non-verbal stimulus tests as the ones constructed by Wallach and Kogan. Figural-ambiguous stimuli have been utilised to elicit realistic objects and events as representatives of the figures.

Wallach and Kogan (274) mainly base their arguments on Mednick's findings and regard creativity as related to generation of associates - immediate as well as remote. However, they regard Mednick's Remote Association Test as a test of creativity in a strict sense, because the test involves an operation calling for a response predecided by the investigator. Guilford regards RAT as a measure of NMR (Convergent Production of Semantic Relations) as the operations are similar to his Associations III and IV.

Flanagan's Ingenuity Test has been regarded by some as Creativity Test. Guilford doubts the validity of the assumption on the grounds that the test involves presupposed single solutions and also involves considerable distraction due to provision of irrelevant distractors. However, such conclusions are risky, as Guilford points in the case of Mednick's Test. Factor analysis might throw enough light on the operations involved in these tests.

Various scoring hypothesis and stimuli will be considered in the chapters to follow. The brief description in this chapter has been given only to acquiant the nature of different instruments for identifying creative children. Biographic inventories and personality tests have not been described. As such, they are not tests; no doubt, potential instruments providing peripheral measures for identification of the creative.