In the year 1925 Terman studied 1,000 gifted children. Others followed the lead and in the early years there was a remarkable addition in the knowledge about the gifted child but thereafter there was a slackening of progress. Psychologists observed many characteristics of the gifted child but assessed a few. On the basis of this partial assessment, they tried to step further. Hence the theories developed by them throw light upon only a specific giftedness of a restricted group. Even Terman himself could not escape from this limitation. As a first step in the selection procedure he had asked teachers to select students on the basis of many characteristics which included such as originality, curiosity, exceptional giftedness in music, drawing, mechanical ingenuity etc., and there were 10,000 nominations. However as a second and final step he used only intelligence tests – National Intelligence Test and Stanford Binet Test. These tests eliminated 9,000 out of 10,000. Then for special ability cases he planned a supplementary search but two findings disappointed him. The average IQ of these cases was rather low (IQ 114), and to appraise the special abilities he had no other better instrument.
Thus Terman wanted to assess the gifted child for various abilities but his measures rejected many who were nominated by their teachers only for special abilities. It is surprising that this point was missed by other psychologists and they proceeded further epitomizing giftedness within one concept of intelligence as represented by conventional IQ metrics, and neglecting many mental processes accounting for giftedness. Consequently most studies in this field assumed close relation between creativity and intelligence.

The use of intelligence tests as a comprehensive measure of cognitive functioning was criticised by factor psychologists. Its unguaranteedness was confirmed in correlational studies of intelligence, and originality or imagination. In fact this kind of distinction was made quite early in old experiments on imagination by Dearborn (1898), when we had not even intelligence tests. This was also being supported some times (Prescott 1926, Fernberger 1936, Ruch 1937). Spearman in his Creative Mind (1931) proposes for three principles of knowing (Neoogenesis). One of these, 'tendency to generate correlates', attributes creativity. Psychoanalysts also had shown that the talented are not necessarily artists (Hirsch 1931). However it was only when J.P. Guilford clearly distinguished between convergent and divergent thinking and constructed new kinds of tests to measure the latter (Guilford 1958), that the psychologists
were strongly convinced of the limitations of IQ metrics and their interest in cognitive aspect of creativity was increased.

This increasing interest in creativity opened many avenues of research. Numerous workers have devoted themselves to this field. A few of them who are working in United States may be mentioned. Guilford at Southern California, Taylor C.W. at Utah, Mackinnon at Berkeley, Ross Mooney at Ohio, Osborn at Buffalo, Getzels and Jackson at Chicago, Anderson and Mednick at Michigan, Maltz at Los Angeles, Torrance at Minnesota, Stein at New York, and many others. Presently the word creativity is gaining fascination from other fields also. The ever increasing number of research notes on this topic, appearing in various journals devoted to the fields other than psychology is an immediate illustration of how research in creativity is widening in recent years.

But this amazing word has not remained a scientific term which is of interest only to the men of science. A mathematician in his department, an organizer in a business firm, a political leader on his field, a teacher with his pupils, and even a mother — all are interested in knowing the act of creativity, the creator and the product. This diversity of interest has stretched the concept towards all directions, each one giving a partial view. So though the same concept is used it does not necessarily imply the same. It is being used as an epithet for a number of things-
creative work, creative reading, learning, behaviour, and even a 'creative toy'. As an abstract noun it is still more abstract. It is defined in various ways. One may say how can we expect to have an agreeable definition of creativity when what is definition is not definite. There are 12 definitions of definition (Mileo 1957). This variety of approaches has been a prominent characteristic of the recent research in creativity. Synthesizing these diverse currents and following that unique way would be an unsurmountable task.

Stuart Golann has briefly summarized all research in creativity as,

"Creativity has been viewed as a normally distributed trait, an aptitude trait, an intrapsychic process and as a style of life" (Golann 1963).

Following Golann, the previous research has been surveyed here in four parts.

1) Emphasis on the product of creativity.
2) The act of creation: Theories of creative thinking.
3) Factors of creativity: Factor analytic approach.
4) Personality of the creative individual.

Out of these, first three approaches are reviewed here, studies regarding the personality characteristics will be reported and discussed only at relevant places.

Whatever little empirical work has been done in India is reported in a separate appendix towards the end of this chapter.
The Greatlye Produot

Many psychologists assume creativity to be 'unitary or multifaceted trait normally distributed in the population and that the prediction of this trait is possible only after the product is judged to be creative. To them the difference between creative and non-creative individual is only one of degree. Some of the definitions proposed by them at Utah Conference may be cited here.

Ghiselin - The measure of creative product will be the extent to which it restructures our universe of understanding.

Lacklen - It is the extent of the area of science that the contribution underlies, the more creative contribution, the wider its effects.

Sprecher - It is novelty and the value of scientists' ideas and their work habit. Sprecher also thinks of opportunity to be creative.

Stein - The process is creative when it results in a novel work that is accepted as tenable or useful or satisfying by a group at some point in time.

These definitions may well specify the approach of product psychologists. When the product which is a result of ability and process, is judged creative the trait can be predicted. For the evaluation of the product we have to depend mostly on social judgements.
McPherson (1963) while determining the inventive levels of patents, proposes some ultimate criteria for measuring creative output of the scientists. One of the best sources for these criteria, is the product. He provides an eleven item list of creative scientific products, including some as patents, publications, research reports, new instruments, ideas and methods, and products. From his criterion list, he discards the number of products because whether the product is patentable, depends not only on the standard of originality but also on many other environmental correlates. Utility is the predominant reference variable. There are some other characteristics as novelty, instrumentality, and pre-experimentation. McPherson though insists on product, feels the need of considering the process through which the product is achieved.

However the ultimate criteria that he proposes are judgements on the creative level of scientists, number and ranking of products, analyzing all inventions and ranking all scientists according to that analysis.

But as Brewster Ghiselin (1963) points out we have to rely mostly on proximate criteria and we don't have adequate criteria. While defining creativity at Utah conference he distinguished two levels of creativity for getting true criteria, a higher level introducing some new element of meaning or some new order of significance while
a lower level giving further development of established meaning by initiating some advance in its use. At the lower level of creativity dependence on existing order is more.

To arrive at ultimate criteria inquiry into the intrinsic nature of products is the first step. Ghiselin defines product as 'a physical or spiritual thing brought into being by human agency' with a definite purpose even when it is spontaneous. The creative product is unique not only to the mind but also in its structure. Like McPherson, Ghiselin too considers the relevance of utility but reference to utility value is not a requisite, he thinks.

The levels of creativity, distinguished by Ghiselin were noted by Gamble too (1959). He suggested a truely creative product or a contribution has a characteristic of being itself creative in the sense that it generates additional creative activity". This also provides a basis for measurement of levels of creativity; the lowest creative product solving the immediate problem, and the highest opening the wide range of the related problems.

Calvin Taylor has done a considerable work on this problem. His argument is this. For the measurement of creativity both product and process may be of practical value but 'for developing criteria for the evaluation of the degree of creativity assessment of product is more important and acceptable ...... , reason is that product is far more tangible' (Taylor 1964).
To evaluate the effect of any variable upon creativity valid criteria are necessary. In their work with research scientists, Calvin Taylor, Smith and Ghiselin (1963) used some measures as judgements of supervisors, peers, chiefs and official records, reports and publications. The scores included ranking and ratings on productivity, creativity, elegance, number of awards, ideas suggested and personality characteristics. Analysis of these scores (for one sample, N = 166) yielded 15 categories including such as originality, productivity, quality of written work, scientific and professional society membership, status seeking, actual status etc. The important conclusions of this analysis are these:

Originality of work and thought is different from high quality of elegance and organization of report.

Organizational awards and creativity ratings by supervisors and chiefs are not related with originality.

Science-categories and organization-categories are negatively related. Most of the product criteria are of the second type.

Academic grades and research work show very little relation.

Age and years of experience had no significant effect on the scores. However some of the variability could be attributed to the source of information.
McNemar (1964) criticises C. Taylor for the vagueness of what is meant by creativity and productivity in science. However the same personal history form was used in further researches and psychologists claim for its utility. McDermid (1965) proved personal history form to be most valid. Buel et al (1966) obtained significant validities for personal history scores. The key previously validated for research personnel in petroleum laboratory was used for those in pharmaceutical laboratory. He argues, "... Empirical keys may have more generality than is commonly believed" (Buel 1965).

In the studies which deal with assessment of products previous creative achievements are very often taken as best predictors of similar achievements in respective fields. This view then leads to the use of questionnaires including biographical items. Klein's (1967) IAQ can be used as a criterion of non-academic accomplishments and also as a predictor of future achievements. He recognizes three levels as simple participation, originality or high level of skill and significance as evidenced by public recognition. These criterion measures can be scored for both quality and quantity of accomplishments (Klein 1965).

The limitations of product criteria have been noted in many studies, not to discourage the product approach but to demand serious thought. Harmon (1963) correlated
judgemental ratings with objective reference variables extracted from the questionnaire and it was found that the number of publications was given the highest weight, income and year of Ph.D. were the next. He too notes that "Situational factors ... make a lot of difference in the criterion. This is a tremendously difficult thing to assess ... " (Harmon 1963 P 51). The validities of selection instruments against the criterion were generally low and even negative. In the conclusion he points out the limitations of questionnaires and expects better variables from confidential reports and interviews.

Flanagan finds low correlation ( .30) between peer ratings, the frequently used product criterion, and ingenuity. He differentiates between productivity, creativity and ingenuity. These emphasize quantity, novelty and unusualness, respectively (Flanagan 1963).

Brogden and Sprecher, in their chapter on criteria of creativity (Creativity - Progress and Potential 1964), distinguish between absolute and relative value of product. The whole book is oriented towards 'applied research' and the authors are more concerned with scientific creativity while dealing with criterion problem. For creativity in research, distinction between direct and supplementary products is more important. The different aspects from which a product may be viewed are novelty, quantity, sheer value in terms of more independence of standard and breadth of application.
For the forceful argument for the product approach Brodgen's words may be cited. "... the ultimate criterion of creativity ... is ... bound up primarily with products ... at least in applied science, research should be concerned almost entirely with those things of practical importance whose production it seeks to facilitate. The aim of applied science is to produce end effects, and when the end effect in question has been defined and a measure of it found, this is the criterion. A criterion so developed is by definition made up of products or aspects of products, not of processes" (Brodgen 1964 P.167).

For the correct description of the present position of evaluation of the product Ghiselin's statement may be reproduced. "Estimates of creativity in men and their products have been more or less subjective or objective, ranging in this respect from simple subjectivity of intuitive appraisal to the still simpler objectivity of numerical counts" (Ghiselin 1963 P 30). Mostly this evaluation is simply 'guesswork'.

And so we have to add Sprecher's words. He differs from the product psychologists in adding that, "Process measures may help to identify people whom one would want to call more 'truly' creative. ... 'How' a product ... is achieved, is of tremendous ...... importance" (Sprecher 1964 P 168).
A study of the process of creative thinking becomes rather general and broader too. It would be more proper to see Wertheimer's propositions first, before having a view of various other theories.

The Gestalt Interpretation

Wertheimer in his book on 'Productive Thinking' (1945), discussing interestingly the crucial problems in fine concrete instances of productive thought, examines the traditional view and gives the gestalt interpretation of thinking. He finds traditional logic and associationism inadequate to explain the process of productive thinking.

The operations characteristic of traditional logic are concerned with the criteria that guarantee exactness, validity and consistency. Both deduction and induction explain the actual sensible productive thinking, through barren and rigorous steps. They lead to critical mindedness and not to productive thinking. The classical association psychologists as Locke and Hume would explain thinking as a chain of ideas and to understanding thinking we have to look for the laws governing the succession of ideas. The paucity of both the views for understanding the productive thought lies in the fact that the very concepts used by these theories cannot meet the processes of this kind of thinking.
Wertheimer as is interested in thought processes in actual affairs demonstrates how actually we solve the problems. He lists genuine, clear, direct, productive processes involved in solving a geometrical problem. He also illustrates from Einstein's thinking for his theory of relativity and from Galileo's for his discovery. In this, light is thrown upon how problem is solved, how thinking proceeds and what are the stages in between. Thereby he says, "People are able to think that way but the strong external forces such as blind habits, certain kinds of school drill, bias or special interests, work against them". The operations through which thinking proceeds are not piecemeal. They are related to whole characteristics and function with reference to them. They are not simply of the character of summative aggregation, or succession of piecemeal or chance happenings, but inspite of difficulties and deviations they show consistency in development. While developing they lead to sensible expectations and assumptions. These type of processes provide for concrete possibility for genuine, sensitive and productive processes.

Thinking consists in "envisaging, realizing structural features and structural requirements, proceeding in accordance with and determined by them and thereby changing the situation in direction of structural improvement". He explains the basic nature of thought processes as there are
two situations, $S_1$ in which the thought process starts and $S_2$ in which it ends. $S_1$ is structurally incomplete and contains structural troubles and strains that are resolved in $S_2$. The very character of the steps of changes between $S_1$ and $S_2$ springs from the nature of vectors set up in these structural troubles which is determined by so called Pragnaz principle, by the tendencies of the good Gestalt, by the various gestalt laws'. Narrow and inadequate view and much concern over details often blocks direct progress of thought process. When the individual needs become one with the situation then the problem is solved.

Wertheimer's explanation seems to be applicable to certain types of situations. The particular process may be a closed whole ($S_1 \ldots \ S_2$) or a partial field ($\ldots S_1\ldots S_2$) within the general process of knowledge. The other type of situation ($S_1 \ldots$) does not involve a concrete goal as to $S_2$. There is only $S_1$, and the process of thinking is nothing but realizing the problem in the right form. The fourth type is where $S_1$ plays little role and the process starts by anticipating some features in $S_2$ which is not yet created. This account satisfies for the first three situations but, as Getzels points out, they are not equally applicable to the fourth situation where thinking proceeds from above ($\ldots S_2$) to concrete parts though the vectors are similarly determined by inner requirements (Getzels 1962).
One of the implications of this position is that the most significant variable in the process of problem solving is the structure of the stimulus, and the next is that the process is the function of the inner structure of the problem.

This position is extended in Neo-field theory which is worth citing here. Asher (1963), while exposing this theory, first differentiates between learning and problem solving. Learning is a process of forming a concept within a cognitive system and problem solving is a process of disrupting established concepts or producing a closure by generating alternate concept. Thus it is inverse of learning. The defence for maintaining concept constancy and the homeostasis of the general cognitive system may result into contra-disruptive forces blocking the problem solving process.

This homeostatic principle of concept constancy explains the transitional character of problem solving. The exact model of problem solving is put forth by the author. The first of the five phases through which problem solving proceeds, is concept disruption. This phase occurs through four strategies. The problemless field is transformed into a problem field, and critical analysis makes the situation highly ambiguous. In this, prior learning determines the tolerance of ambiguity. Existing assumptions are denied then and reality constraints are relaxed to generate alternate concepts.
The second phase is a state of tension due to 'a lack of closure' and the third, tension sustainment. If this tension is well tolerated, the sensory thresholds will be changed for selective perception and there will be an increase in fantasy activity toward the goal. This is the fourth phase and then the fifth is a series of alternate concepts more or less adequate for the solution.

This way of elucidating the process of problem solving, consequently gives a very suitable measure of creativity. The proposition is this: Creative problem solving is a free play of concepts which depends on disruptive tolerance. Higher the concept constancy, less the disruptive tolerance and so less the creative potential. Individuals having less tolerance would not easily accept another concept for the previous one, though it may be gradually changed into another. Ascher used then five tests (each consisting of 20 drawings) similar to Frenkel Brunswik's dog-to-cat measure of tolerance of ambiguity. The point at which individual abandons the initial concept and correctly perceives the another determines the score for disruptive tolerance.

Thus, presence of structural troubles and dis-equilibrium of ideas, experience of tension and tolerance of ambiguity are the characteristics of the process of creative thinking. Dunker (1923) fully supports gestalt view.
Even those who follow other approaches take note of these characteristics. In associationistic explanation they think of 'dissociation' as a preparatory stage (Ribot 1900), while in four stage classification they name it as 'disequilibrium' (Patrick 1949). In psychoanalytic explanation it is 'psychic tension' (Wilson 1954), and in the measurement approach it is 'tolerance of incongruity' (Jackson 1965). There are many other psychologists who have studied this aspect. (Dewey 1934, Gordon Kate 1935, Feibleman 1945, Stein 1953 and Kuhn 1963 and Clark W.H. 1955).

**Psychoanalytic Explanation**

Getzels finds psychoanalytic approach as the most systematic treatment of creative thinking (1932). Freud analyses activities in day dreaming and phantasy on the line parallel to the imaginative works of the writer and for this he selects renowned writers and also the common. Phantasy activity travels back and forth, taking the traces of both the present engendering situation and the past memory, thereby creating the situation that will emerge in the future and represent the fulfilment of the wish. Thus analysing the motives behind the characterisation by the writers, he says "Some actual experience which made a strong impression on the writer, had stirred up a memory of an earlier experience, generally belonging to the childhood, which then arouses a wish that finds fulfilment in the work in question, and in
which elements of the recent event and the old memory should be discernible." Thus, "imaginative creation, like day dreaming is a continuation of and substitute for the play of childhood" (Freud 1959). Even the artist himself would be ashamed of his phantasies, but he overcomes the feeling of repulsion using the disguises that change the character of daydream and gets the formal pleasure in reproducing.

Getzels very properly quotes Felix Deutsch's (1960) citation of Freud that, "The forces motivating the artists are the same conflicts which drive other people to neurosis" Deutsch then adds, "As the instinctual pressure rises and a neurotic solution appears imminent, the unconscious defence against it leads to the creation of an art product. The psychic effect is the discharge of the pentup emotion until a tolerable level is reached" (Getzels 1962).

However individuals differ in their strength of sexual instinct and ability of sublimation (Freud 1958). Most of the individuals require direct satisfaction. Ability of using the sexual impulse for non-sexual goal and deriving a formal pleasure, is limited. A few persons have this ability and that too intermittently. Though phantasy making is governed by pleasure principle, it is also guarded by reality principle which does not hurt pleasure principle.

Why does creative activity remain limited even within the people having high intelligence and high ideals? High ego ideal may ensue repression but does not assure sublimation. In sublimation sexual impulses are redirected to non-sexual
aims, and the unconscious becomes 'ego-syntonic'. In the latter case freely rising phantasies need not be rejected. Freud, as quoted by Getzels, remarks, "In the case of creative mind, it seems to me, the intellect has withdrawn its watchers from the gates, and the ideas rush in pell-mell, and only then does it review and inspect the multitude, .... Hence your complaints of unfruitfulness; for you reject too soon and discriminate too severely" (Getzels 1962 P 91).

Getzels thinks, this Freudian explanation distinguishes clearly between convergent and divergent thinking, between 'impulsive reasoning' and free imagination.

In neo-psychoanalytic treatment Kris (1953) and Kubie (1958) substitute Pcs in place of Ucs. The shaping of material before it reaches to Cs, takes place in Pcs. The emotive potential grows and causes the act of 'creative communication'. For Kubie, the free play of preconscious processes is most important. Kubie goes still further and rejects the role of Ucs. Where unconscious is dominant creativity is identical with neurosis. The work of Cs is identical with neurosis. The work of Cs is evaluation and the product of preconscious activity is creativity.

To support this kind of explanation Getzels gives Einstein's words. "The psychical entities which seem to serve as elements in thoughts are certain signs and more or less clear images which can be 'voluntarily' reproduced and combined ... the desire to arrive finally at logically
connected concepts is the emotional basis of this rather vague play with the above mentioned elements .... This combinatorial play seems to be the essential feature in productive thought" (Getzels 1962 P 99). Getzels finds this 'unhibited spirit of play' in his own study of the gifted.

Murray (1959) accepts sources from Ucs, Pes and external world, and thinks 'permeability between Cs and Ucs,' and 'passionate psychic energy' are the requisites of creative thinking. Rosen (1953) follows Kubie attributing preconsciousness to creative thinking.

Freud's theory of sublimation has been criticized as full of confusions and contradictions. (Levey 1939, Rapaport 1950). It is contradictory to his original position (Bergler 1945). Creativity is not subordinate to other goals (Alexander 1948). What is expressed is not the infantile conflict, not the defence but the defence against the defence (Bergler 1948). The analysts differ among themselves to a large extent. They do not conceive Freud's theorization in the same manner. Bergler does not take note of Freud's consideration of reality principle acting as a guard when he ..... thinks creative activity is not objective as it ..... emerges from conflicts. Psychoanalysis since Freud had only increased the confusion (Levey 1939).

Freud's parallel between creativity and neurosis has been stretched to the position that artists are neurotic (Bergler 1947, Fenichel 1945, Hutchinson 1949). In fact the
contribution of Freud's theory is that sublimation prevents neurosis (Levey 1939). Bychowski points out (1951) that sources of creative urge are less pathological.

Stronger repudiation of Freudian theory comes from Jung (1928). He thinks, the 'reductive' method of tracing creativity back to parent-child relationship is not appropriate. Even if such tracing is granted it does not imply creation is necessarily related with neurosis, only on the grounds that factors of neurosis too can be reduced in the same manner. Such a parallel is rejected by other psychologists too (Bern 1945).

However the key concept of Psycho-analytic explanation, the Ucs, has been widely used to explain the phenomenon of creativity, even by those who follow other approaches. Here Ucs is mostly considered as a source of the content of, rather than motivation for, creative thinking. It has been fully or partially supported. Poincare (1913), Prescott (1926), Montmasson (1951), Hadamard (1945), Feibleman (1945), Portnoy (1949), Hutchinson (1949) and many others have given more importance to Ucs. McKellar (1957) and Golvin (1962) think both Cs and Ucs are necessary. Sinnott (1959) accepts that creative mind is active at unconscious level; but thinks, its working there may not be different from that at conscious level. Though the importance of Ucs is accepted, the affective side is rejected by Ribot (1900) and sexual source, by Bern (1945)
and Arnheim (1948). Sexual impulses and their sublimation
is not the total fact. For creation of higher qualities
other motives are important (Arnheim 1948). Art is
sublimation of life instinct and not sex instincts. At the
end of this unique but the mysterious exposition of the
theory of creative thinking, the only conclusion is, as
Rapaport (1950) finds, that this distinction between Ucs
and Cs is only arbitrary and that psychoanalytical
explanation is full of ambiguities.

In psychoanalysis some psychologists have developed
different theories of creative thinking. It is need for order
(Lee 1950) or for both order and disorder (Barron 1958). It
is the principle of self-actualization (Rogers 1959) or of
perceptual openness (Schachtel 1959).

These old and new formulations have maintained
their importance in the explanation of thought even in recent
experiments. Barron's statements in his report of the
experiment with effects of hallucinogenic drugs on
creativity (1964), accord with many of the old
generalizations. He used psilocybin with creative writers,
painters and musicians, and recorded their responses. He
thinks principle of Homeostasis to be antagonistic to the
creative thinking. Conflict between this principle and new
experience induces tension. Ordinarily, either is maintained.
In creativity, the contradictory principles are uniquely
integrated. In his experiment, psilocybin dissolves the very basic distinction between 'self' and 'not self' through ego diffusion and increases creative activities of the outstanding creatives as well as of the average person. His subjects had a pleasant experience when they could 'give up the project of the ego'. They reported increase in sensory clarity and aesthetic appreciation due to alterations of consciousness. What was experienced in drug session was also carried over. Use of drugs for constructive alteration of consciousness has been supported by other experiments (Leary 1962, Aldous Huxley 1954).

The Operational Description

Vinacke's (1952) explanation shows traces of some other old propositions. He explains "Most actual thinking alternates between two poles - realistic one and imaginative one. The successful thinking is much intermediate mixing of the two styles". Creative situation is both problem solving and fantasy. It is problem solving without any predetermined solution ($S_c$), and self expression is its dominant feature. "It is fantasy, reorganizing past experiences freely influenced more by inner need states which for a large part are under greater voluntary control. This fantasy when externalized, results into tangible final product which, unlike problem solution, is more satisfactory achievement".
But he argues against the special treatment being received to creative thinking. The reasons are these. The thinking leading to creative product cannot be comprehended clearly. The wonderful product is not necessarily outcome of wonderful process and so thinking of the creative and non-creative need not be different in kind.

Vinacke refers to the Patrick's experiment. Patrick in 1930 studied writing of a poem, painting of a picture and solving of a problem and the general conclusion was creative thinking proceeds in a series of stages; preparation, incubation, illumination and verification. This was more or less confirmed by other researchers with the modification that these stages do not necessarily occur in a well defined sequence. When Vinacke analysed the thinking processes of his subjects and he asked them to produce publishable picture illustrating the theme of a given poem, he found the same. So he argued that these overlapping stages should be called as processes (Eindhoven and Vinacke 1952).

To Patrick, major differences between creative and non-creative have to do with the manipulation of perceptual emotional response, training in techniques of expression, quality of resulting product, skill and the frequency with which creative situation is presented. She too, does not approve assumption of unusual qualities for the creative. Any creative situation may evoke creative
thinking depending on above factors, and spontaneity depending on learning, living conditions and personality structure.

Robert Thomson (1959) has maintained Vinacke's view and points out that Patrick's experiment only shows that common man works in a style similar to some great artist's. Thinking is dynamic, intense and highly personal activity which cannot be tied down to any formula. Some creative thinkers give inspired performances following impulse from start to finish. Thomson seeks for the motivation of thought in an inner state of disturbance and explains the goal directed behaviour on the line similar to that of Wertheimer ($S_1 \rightarrow S_2$). He also takes note of freudian approach and recognizes the importance of Ucs in the explanation for goal directed behaviour. He asserts Maslow's position that in a motivated behaviour whole person is motivated. He then gives the conditions of creativity as preparation, incubation, prior learning, receptivity, adventurousness etc. He cites Thurstone's observations of thinking of two students and the conclusion that, "Really the emphasis in creativity is probably on the readiness to side with and explore sympathetically the possibilities that can be found in a new hypothesis. Such attitudes are probably a function of personality". Thomson also gives more importance to personality factors. The difference between genius and common man is one of degree. "May be that there is some factor in the case of
genius which accounts for his leap ahead. But if so what it is, we do not know."

Berlyne (1965) too does not approve the special treatment given to creative thinking, because whether the product of thinking is creative or not depends on social evaluation; and uniqueness determined by social criteria does not imply the same thing in the thinking process. So creative thinking should not be studied apart from non-creative forms of productive thinking.

Similar to Patrick, Wallas (1926) too elucidates creative thinking through four stages. Preparation is 'preliminary regulation of thought' and is more logical in its nature. Incubation is the absence of conscious work, and occurrence of 'unconscious and involuntary events'. However relaxation is not the condition for this stage. Illumination is the third stage which should not be explained as 'a sudden flash'. Some psychologists use the word 'fringe-consciousness' to describe this stage. Wallas uses another term 'intimation'. Intimation is the stage of gaining consciousness of coming success and it can be controlled by will. Verification is the stage in which ideas are put in exact form and validity tested.

Dashiell (1931) distinguishes similar four stages, but he differs in that he characterizes the process as 'sudden occurrence of ideas from nowhere in a relaxed state without awareness'. He adds again, "but the creator does not wait for
inspiration*. He relates inspiration to insight in learning, to the successful recall in memory experiments.

Westcott and Farnes (1962) too propose that creative thinking can be seen in 'learning' and there is no need of isolating creative person for the study of creative thinking. Westcott empirically studies what is intuition and shows it is 'a normal process amenable to psychological analysis.' In support he reproduces experiments by Pickford (1938), Snapper (1955) and Blatt (1960). Bouthilet (1948) arrives at similar conclusion.

In this connection an authoritative argument comes from Woodworth (1962). He does not accept a theory implied by incubation though 'the word serves to be a useful catchword'. Incubation is absence of interferences. The characteristic of unconsciousness is unreasonable. There is conscious recurrence in the period of incubation and it comes in between intense concentration.

Crutchfield (1961) suggests that 'incubation may permit, perhaps unaware to the individual, new and better cues from the environment and from ideation, to develop while one engages in other activities.' He recommends a functional analysis instead of four stages. Thurstone (1952) and Hyman (1962) give more importance to preparation than insight. Intuition does not make the whole story of creativity (Eyring 1959). Creativity is a complex process in which 'sustained analysis of great many observations' is an important stage.
Psychologists giving this kind of operational description, classify creative thinking into different stages. However the number of stages is not unanimously given. McKellar (1957) classifies the whole process into only three stages while some others seem to be not satisfied even with four stages. Wilson (1954) and Spender (1946) propose five stages while Israeli (1952) and Harmon (1963) propose six stages. Harmon explains that creative thinking proceeds through a) realizing the need, b) gathering information, c) thinking through, d) imagining solution, e) verifying and f) putting the ideas to work. The creative mind proceeds through these stages with a greater speed than the common mind.

Hadamard (1945), Feibleman (1945), Hutchinson (1949), Portnoy (1949) accept four stage classification. History of psychology of thinking shows that this four stage explanation was the general feature. We find it from Poincare (1913) to Woodworth (1962). One more general feature is that thinking is explained as a goal directed behavior (Ribot 1900, Cowell 1926, Harmon 1957, Galvin 1963).

**An Associative Interpretation**

The operations characteristic of association theory are association, recall from past, trial and error, learning after repeated success and acting in line of OR. Wertheimer has shown the insufficiency of classical association theory to explain creative thinking.
However many of the laboratory experiments are based on this approach. Psychologists interpreting creative thinking in associationist terms quote Einstein that, "The psychological entities which seem to serve as elements in thought are certain signs and more or less clear images which can be combined. This combinatory play seems to be essential feature in productive thought" (Mednick 1964 P 55, Ray 1967). Thus what is novel, unique is the way in which old ideas get combined. With this position the creative process studies become the different techniques in association experiments. Mednick and Mednick describe this view as 'perhaps the most systematic and enduring formulation'. They define creative thinking in associationistic terms as "creative thinking consists of forming new combinations of associative elements, which combinations either meet specified requirements, or are in some way useful. The more mutually remote the elements of the new combination, the more creative is the process or solution" (1964 P. 55).

Mednicks describe three possible ways of creative thinking. These are serendipity, similarity and meditation. Serendipity is an accidental co-occurrence of objects in the environment and thereby suggesting relevance of two unrelated ideas. Cannon (1940) illustrates this mechanism in some of the great discoveries. His own theory of emotion is an illustration of serendipity. For serendipity a fund of information and an open mind are necessary.
Similarity is other method. Similarity of the objects or similarity of associative elements may cause new association. The most important mechanism is mediation through which 'requisite associative elements may be evoked'. Two unrelated ideas can be pulled together by mediation of the third which is associated with both.

Thus the ability to bring remote ideas into 'ideational contiguity' will facilitate creative thinking. Individuals will differ in this ability according to the type of organization of associations around ideas, 'associative hierarchy', characterizing the stimuli or the individuals. Individuals having steep hierarchy give stereotyped associations and those having flat hierarchy are unreliable associators. Subjects belonging to the latter category give more unconventional, a typical responses and there is a possibility of creative solution. Rigel et al (1966) found the flatness, to be related also to the nature of the task. This theory has given, now very widely used test RAT in which S is asked to give one word relating the three unrelated words.

Maltzman's (1960) experiments are much in the same direction. The same list of words is given for 5 or 6 times. S is requested to give different response words for the same stimulus in successive trials. In the first trial, the responses of the group come closer. In further trials as
S tries to go further from his own old response he also goes so from others and probability of being uncommon increases. But Maltzman could not specify the conditions under which originality will appear.

This kind of interpretation can be seen in Bennetts' and Wesman's experiment (1941). They used free response technique for assessing productive thinking. In their experiment originality and scope of response give the score. Rigel et al (1966) when analyzed 'associative behaviour and creativity found that responses of high creatives did not scatter on equally large range for all tasks. Wilbert Ray (1967) follows the same view, while giving different techniques to increase the quality of originality. He thinks original thinking to be operant behaviour, the frequency of which can be increased by reinforcement. As it can be operationally defined, it can be explained by experimental tasks such as Wisconsin Card Sorting test and RAT.

It has been seen that Wertheimer disproves this kind of explanation of original thinking. The gestalt psychologists insist on insight. While the implication of association theory which invites more criticism is this: different words get combined; there are many trials and errors; and a novel combination is 'original response'; for this, use of machine is quite acceptable.

The first standpoint against this theory is that in the process of creative thinking many trials are too momentary to report, hence cannot be created. Newell, Shaw and Simon (1956
proved with the help of computer that pure trial and error basis is not practicable. But Cambell (1956) explains this process as 'blind variation and selective retention' and that even blind variation proceeds from both ends and does not use all alternatives. Mary Henle (1967) brings Kohler's insight and trial - error process closer. She thinks, errors in creative thinking are creative errors or good errors'. Though creativity is a result of combinatorial activity, it is not only permutations. It is 'discernment and choice' (Bruner 1967). "Even a rat learning to run a new maze proceeds by forming hypothesis" (Koestler - no date P 6). Koestler (1964) thinks creativity as 'lucky bisociation', association of two mutually exclusive ideas.

Leary argues for the use of machine. He thinks two aspects of creative thinking - creativity as a personal game and as an original performance. Uniqueness and behaviour change are aspects of originality, and for uniqueness unrelated words may be combined with each other to have novel combinations. He argues, "I cannot think of any creative performance which could not be facilitated (and indeed most performances entirely proceed) by machine. Behaviour is movement in time/space, and almost all movements in time and space are better performed by machine" (Leary 1963).

Summary

Thus the process studies deal with various aspects of creative thinking. In fact these studies come from all
fields of general psychology. They deal with instinctual forces and motivational factors. They show importance of personality make up for creative output. Psychoanalytic interpretation is unique and it does not remain without important bearings on other studies. The mystery of Cs, Ucs and Pos occupies large space in these reports. Different terms are used for these.

These studies throw much light on mental processes occurring through an act of thinking. In this they take diverse views. Wertheimer refutes association theory and leads us to a gestalt view. Equally well recent experiments convince us of associationistic explanation. Taking the same event they have illustrated their diverse views. Strangely enough it might be noted that the same account of Einstein's thinking for his theory of relativity, has supported gestalt view, association theory and psychoanalytic approach. May be that his thinking for 'Relativity' has been relative to these psychologists.

The four stage classification seems to be agreeable to many with some minor differences. Some of them give more importance to preparation. 'Incubation' has been the most controversial stage. The duality of Cs and Ucs appears here too. Its consideration here has been important in that it determines the control over incubation. Experimental psychologists as Woodworth deny the very concept 'incubation'. Some psychologists do not approve the special treatment given to creative thinking. To them the difference
between the genius and common man is only one of degree and factors of creativity have much to do with situational factors, learning and personality characteristics.

These psychologists think 'learning' to be the proper field for the study of creative thinking while neo-field theorists precisely differentiate between learning and creativity and think them to be bipolar concepts.

All process studies are criticized by McNemar for not having actual criterion information (McNemar 1964).

Does then product approach give us a definite position? To Harold Anderson (1959) there is no such question for top levels of creativity. He thinks that the intention behind the external evaluation of the product is to have 'power over' the creative person and that the free play of internal evaluation is the first premise of creativity. In 'the spontaneous discussion of the fifth Utah conference (1962) Pros and Cons of these approaches were well pointed out.

Process of creative thinking is not always observable but if we insist on product creatives may remain unidentified (Barron) and there would not be only false negatives' but also 'false positives' (Sprecher). Creativity assessed in the product may not be an outcome of similar quality of the 'cognitive structure' (Hyman). A novel piece may be produced even by simple 'trial and error' without any creative thinking (Sprecher) and so through computers (Leary). However machines
are finite and creative mind is infinite and at any moment irrelevant may become relevant to creative mind (Parnes).

Simply producing the unique is not creativity, whether it meets the requirements should be seen (Mednick). But what requirements it should meet - requirements of the creative person, of the situation or of the popular standards - Mednick does not make clear. Anderson (1959) thinks external evaluation to be detrimental to creativity.

Thus various studies reviewed so far lead us to conclude only that still we have not any agreeable definition of creative product nor of process. McPherson points out that there are 20 definitions of creativity. When Mednick, in the fifth Utah conference asked the participants (N = 24) to give associations of creativity, the frequent associations were originality, newness, novelty and unusualness, but there were 360 unique associations. This shows how divergently we think of creativity. To have a clearer view of creativity than what these studies give, we have to follow Guilford, along with his factor analytic approach.

**Measuring Creativity - Factor Analytic Approach**

Many psychologists insist on analyzing the characteristics of cognitive operations involved in creative performance and using suitable tests to measure these characteristics. The general approach is to find the
correlation between various creativity measures and intelligence, and also within creativity measures. The assumption is these correlations would signify the abilities that make for creativity. These abilities are 'continuous variables', normally distributed differing only in degrees. Guilford has accepted this trait approach (1950) and in his continued work since 1949 in Aptitudes Research Project he has been trying to isolate primary factors of intelligence (not in a limited sense as when it is distinguished from creativity) and to discover meaningful trait concepts.

Before going to the what of theory let us first think of the why. The origin of this approach goes back to the recognition of the limitations of the old concept of general intelligence and widely used intelligence tests.

The early interests which initiated psychological testing for individual differences were mostly practical. So psychologists hurried to use their tests without having a modern statistical methods to test the results. Consequently, inadequacies ensued in their studies and in the following research. In spite of these drawbacks old intelligence scales remained unchallenged. A few other tests were tried but could not be popular. That is why, though it is not long ahead to complete the century of mental testing which started with Galton in his anthropometric laboratory in 1882, we had not yet gained a well-comprehensive, theoretically sound and
empirically tested concept of intelligence. It was not the lack of anticipation but the faulty experimentation that lead Terman (1906) to ignore the creative abilities and to measure a single trait 'intelligence' by Stanford Binet scale. Binet, though had not defined intelligence, had emphasized certain operations as memory, imagery, voluntary attention, judgment, adaptation, autocriticism, invention etc. (1905 First Scale). Guilford thinks his description of thinking or problem solving to be quite congruent with recent thinking (Guilford 1967). Binet never had in his view 'monarchic' nature of intelligence though 'a single score was his practical need.' Piaget (1951) too had noticed the multifactor nature of intelligence without using psychological tests and psychometric methods.

Results from many other studies, even from other fields as education, psychopathology and psychopharmacology supported this approach (Hollingworth 1923, deMille 1962, Moran 1953, Goodenough 1940, Ivans and Smith 1964). Guilford's observation (1964) of 7000 correlations was quite conclusive.

He found that the standard scales as Stanford Binet, Otis, Wechsler etc. also could not correlate perfectly. Thus each test has some unique factor and all taken together cannot compass the whole. Only multifactor theory can reason out this fact.
What is a factor?

"A factor is an underlying latent variable along which individuals differ just as they differ along a test scale" (Guilford 1967 P. 41). Factors are stable and give stable profiles. Factor psychologists define factors with new meaningful concepts. They have given us a smaller number of tests in place of several ones, that would measure unitary traits. However, they differ among themselves regarding the model of factors. To Guilford, assumption of 'g' as an basic entry is not agreeable.

The types of models proposed by psychologists are described by Guilford (1967). The classification of thinking process into various stages is an operational model. Piaget's classification of cognitive development into assimilation, accommodation, and concrete or formal is a hierarchical system. Among factor psychologists Burt and Vernon give hierarchical models for which 'g' is the key concept. Guilford suggests morphological model to 'organise the intellectual-aptitude factors in a unitary system'. Lloyd G. Humphrey (1962) gives three facet model but his facet and tests do not define factors.

Structure of Intellect Model

After long scrutinization Guilford and others found no substantial evidence for the 'g' and consequently they
thought the hierarchical models to be inadequate to relate the factors as to give a comprehensive view of intelligence.

Guilford's proposition is this. There are five kinds of mental operations - cognition, memory, convergent thinking, divergent thinking and evaluation. The stimuli differ in content. The content of the problem situation will be figural, symbolic, semantic or even behavioural. The conception formed will be any of the following kinds - unit, class, relation, system, transformation, and implication.

Thus the ability in question can be classified with three considerations, content of the test, operation involved and the kind of conception. The complete Structure-of Intellect evolved in 1958. Its model and definitions of all categories have been given in figure 1 and table 1 respectively. The model hypothesizes 120 factors in all, though all are not proved. It was found that, "the more conspicuously creative abilities appear to be concentrated in the divergent thinking category, and also to some extent in the transformation category" (Guilford 1959 P 478). Till 1967, 84 factors were demonstrated.

The real value of this model is that it guides the construction of test for the hypothesized factors. It is with this model that the clear distinction between abilities being tested in intelligence tests and the creative abilities,
STRUCTURE OF INTELLECT AND THE KNOWN FACTORS OF CREATIVITY

* FOR THE CODE LETTERS REFER TO TABLE 1

** THIS FACTOR WAS SUPPOSED TO BE ENI UNTIL NIHIRA ET AL. (1964) DISCOVERED IT TO BE CMI.
### TABLE I

**Definitions of Categories in the Structure of Intellent**

**OPERATIONS**
Major kinds of intellectual activities or processes; things that the organism does with the raw materials of information, information being defined as "that which the organism discriminates."

- **Cognition.** Immediate discovery, awareness, rediscovery, or recognition of information in various forms: comprehension or understanding.
- **Memory.** Retention or storage, with some degree of availability, or information in the same form it was committed to storage and in response to the same cues in connection with which it was learned.
- **Divergent Production.** Generation of information from given information, where the emphasis is upon variety and quantity of output from the same source. Likely to involve what has been called transfer. This operation is most clearly involved in aptitudes of creative potential.
- **Convergent Production.** Generation of information from given information, where the emphasis is upon achieving unique or conventionally accepted best outcomes. It is likely that the given (cue) information fully determines the response.
- **Evaluation.** Reaching decisions or making judgments concerning criterion satisfaction (correctness, suitability, adequacy, desirability, etc.) of information.

**CONCEPTS**
Broad classes or types of information discernible by the organism.

- **Figural.** Information in concrete form, as perceived or as recalled possibly in the form of images. The term "figural" minimally implies figure-ground perceptual organization. Visual spatial information is figural. Different sense modalities may be involved, e.g., visual kinesthetic.
- **Symbolic.** Information in the form of denotative signs, having no significance in and of themselves, such as letters, numbers, musical notations, codes, and words, when meanings and form are not considered.
- **Semantic.** Information in the form of meanings to which words commonly become attached, hence most notable in verbal thinking and in verbal communication but not identical with words. Meaningful pictures also often convey semantic information.
- **Behavioral.** Information, essentially non-verbal, involved in human interactions where the attitudes, needs, desires, moods, intentions, perceptions, thoughts, etc., of other people and of ourselves are involved.

**PRODUCTS**
Forms that information takes in the organism's processing of it.

- **Units.** Relatively aggregated or circumscribed items of information having "thing" character. May be close to Gestalt psychology's "figure on a ground."
- **Classes.** Conceptions underlying sets of items of information grouped by virtue of their common properties.
- **Relations.** Connections between items of information based upon variables or points of contact that apply to them. Relational connections are more meaningful and definable than implications.
- **Systems.** Organized or structured aggregates of items of information; complexes of interrelated or interacting parts.
- **Transformations.** Changes of various kinds (redefinition, shifts or modification) of existing information or in its function.
- **Implications.** Extrapolations of information, in the form of expectancies, predictions, known or suspected antecedents, concomitants, or consequences. The connection between the given information and that extrapolated is more general and less definable than a relational connection.

(Guilford 1966 Studies of Aptitudes of High Level Personnel, No. 36, F 3 - 4).

""
was made. In his work to date (Deo. 1968) he has been able to demonstrate 20 factors of creativity. These are given in figure 1. The trigram symbols given in brackets show their positions in the total SI model. These factors can be summarized into six traits: ability to see problems, fluency and flexibility of thinking, originality, redefinition and elaboration. Still briefly, creative thinking may be defined as divergent thinking, however divergent thinking does not account for all the intellectual components of creative production" (Guilford 1967). Guilford also estimated the factors in figural and symbolic categories to be more important for artists and mathematicians, and those in behavioural, for the politicians. It does not mean that the creative cannot 'cross the content boundaries' but that content categories make for a kind of creative performance.

Many others who follow Guilford have supported his results. They have used either Guilford's or similar tests. The correlation between DP (divergent production) test scores and criteria of creativity have been reported low in Torrance's study (1962). He prefers functional approach to structural. Yamamoto's (1964) results also concord with Torrance's conclusion. When he analyzed Minnesota tests which are Dp like, he found the factors to be task specific rather than construct specific at least for girls (1966). Saunders too had poor success with creativity tests (1955). In some
other studies correlations between Dp tests and criterion variables are found to be low. For associational fluency Guilford had shown predictive validity. He thinks, the reason of low correlation between DP scores and the criterion scores as teacher nominations, is the unreliability of the latter. He finds, 'where criterion is based on some standardized performance' the correlation is higher (A.E. Jones 1962).

In studies of adults, most of the times, the foremost problem is the criterion problem and psychologists haven't been able to arrive at valid criteria - neither ultimate, nor proximate. Previous discussion points out this fact. Hence the studies which give low correlations between Dp or DP like tests and some criterion scores, do not guarantee the conclusion that DP tests have no predictive value.

In some studies, significant correlations are found (Barron 1955, Chorness et.al. 1956, Wallace 1961, Elliott 1964). However in these and many other studies criterion correlated differently with different DP factors. So Guilford concludes, ".... creative potential is not a single variable, any more than intelligence is". (Guilford 1967, P 166).

Guilford's SI model has initiated a new trend in creativity research. Generally IQ tests emphasize cognition and convergent thinking factors and these abilities we do not expect to correlate with DP abilities which encompass the most part of creative abilities. Among studies of relationship
between intelligence and creativity, Explorations with Gifted Children by Getzels and Jackson should be noticed first. This work has been criticized by many for its imperfectness or contradictions involved (Richard DeMille 1962 McNemar 1964). Though similar distinctions were made previously and that intelligence and imagination are not related, was shown sometimes, only Getzels and Jackson first gave very impressive picture of the differences between two abilities. They claim that among upper 20 percent of intelligents 70 percent from similarly high creatives, are not admitted. Since the present study follows Getzels and Jackson in many respects, their findings and criticism too, will be discussed at relevant places. Their bold explorations into cognitive giftedness and personality characteristics gave many heuristic results. There are many replications of this study, e.g. replication with Scottish children (Parweer Hasan and Butcher 1966).

Mackinnon, Torrance, and Yamamoto are others who have done considerable work on Guilford tests. Torrance (1960) followed Getzels but unlike Getzels he used eight non-selective schools. McKinnon (1962, 1964) found zero relationship between creativity and intelligence among artists, scientists and architects. Among mathematicians the correlation was positive but low. He also supported Guilford's distinction between types of creativity.
Like Getzels many psychologists distinguished between creativity and intelligence and studied their relationship with other variables. Yamamoto et al related these two with achievement and sociometric choice (1966, 1966a). Studies by Irwin Fleisher (1963), Cashdon and G.S.Welsh (1966), Robert Smith (1966, 1967), Eisenstadt (1966), Mackler and Shontz (1967), Cowan and Torrance (1964)* are in the same direction. Meer and Stein (1955) did not use Guilford tests but arrived at similar conclusion. Welsh (1946) developed test of recombination of ideas and got low correlation with intelligence. There are some other Guilford like tests. Test of originality (Chassell 1916), Test for art majors (Fisichelli 1947), Test of ingenuity (Flanagan 1957), AC test of Creative ability (Haris and Simberg - no date).

Psychologists as Burt (1962) and Vernon (1964) are doubtful of distinction between creativity and intelligence because they are skeptical about fractionizing the general ability into less meaningful factors. McNemar insists on general intelligence and the social usefulness of the concept (1964). He points out that Guilford finds moderate or low correlations but does not include IQ. Getzels' results are interesting but his techniques are faulty and his results are assumed in 9 replications, only because the same faulty

* The writer received only the typed copy of the article. The date of typing is 10-1-64. Whether this article is published or not, is not known.
technique is followed. His main objection is that the reason of low correlations between creativity and intelligence is the 'restricted range'. However, when range is not restricted as in Guilford studies, McNemar is still unwilling, saying that 'the predicative value is yet to be seen'. Warburton (1962) too doubts about predictive validity. Super (1958) criticises factor analytic approach for giving more attention to purity of factors than to validation against external criterion. One more general argument against this approach is that results of factor analysis do not remain stable from one study to another (Bechtoldt 1961).

Chorness proves predictive value for Guilford tests (1955). The conclusion of his study with fifty student instructors is that, "the creativity tests can carry the burden of prediction" (Chorness 1963 P 282).

The writer thinks Guilford's approach as the most adequate because his factors give exact view of what we measure by creativity test and to what extent the measured creativity differs from the measured intelligence. His SI model gives 'sounder theoretical footing' (Warburton 1962).
A note on Indian research in Creativity:

In order to present a review of previous Indian studies in creativity, we need not look long back. We have a very short history of discrete researches. These researches fall in three broad categories, viz., study of the process of creative thinking, biographical study of the creative individual, and measurement of creativity by paper pencil tests.

Probably the first study in creativity after the Indian workers entered into the field of psychology, is by Rangin Haldar (1931). He proposes an explanation of Freudian line, for origin and nature of aesthetic ideal and the urge for its realization. He thinks artistic activity to be both like and unlike dream and neurosis, and points out two important elements in it: a narcissistic tendency on the part of the artist, and suggestive element in the object which is called Dhvani (echo) in Indian poetics. Another study following psycho-analytic approach is by Lalitha, M.S. (1957), in which creative imagination is described as an important phase of constructive imagination. On the basis of the experiments with children, it has been shown that imagination is more determined by needs, past experience and contents of unconscious. Aran (1957) gives an operational description of creative thinking. In that he analyses Galileo's thinking for his theory of inertia and Einstein's for his theory of relativity and characterises creative thinking by 6 distinct stages more or less similar to those proposed by previous workers.
A biographical study of creative individuals is by Manas Ray Chaudhuri (1965, 1965a, 1965b). He studied life histories of Indian musicians, Indian non-musicians and American musicians and noticed that more creative musicians were non-conformists and had discomforting early home arrangements. Another study is by Ashis Nandy (1966). He studied the case of Jagadishchandra Bose and pointed out the relation between creative achievements and social values.

Some of the recent studies follow measurement approach. Using Torrance's tests of creativity, Pramila Phatak (1965) found low correlation between intelligence and creativity and no correlation between creativity, school marks and teacher's ratings. Raina, M.K. and Chaturvedi, S. (1968) experimented in laboratory situation to find the effect of competition on ideational fluency. It was found that under competition the experimental group significantly excels over the controlled group in mean number of ideas.

This brief sketch of our research in creativity reflects the impacts of current trends outside the land and also points to the need of undertaking wider and systematic studies in this area. The concept of creativity as a mental ability apart from intelligence and a scientific study of this ability are the recent characteristics of psychological research, and these new interests are just on the way of germination in Indian soil.