

CHAPTER TWO  
REVIEW OF RESEARCH LITERATURE

Eliot D. Hutchinson (1949) conducted a four-year long post-doctoral study of the processes of creative thought under the direction of Prof. McDougall of Harvard and of F.C. Bartlett of Cambridge at the Cambridge University. Hutchinson collected information from such sources as letters, comments, interviews and questionnaires which came from about 250 of the most famous contemporary thinkers of both England and America, men and women from every profession whose achievement entitles them without question to be called creative."

Hutchinson has made it plain in his preface to the book How to Think Creatively that in no way does he undertake to explain creative ability. In this context

he says :

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No one knows at present how integrations of thought take place in the mind, or upon just what principles of nervous action they ultimately depend. The problem can be dealt with only descriptively; explanation can be only approximate. But we can study the objective experiences of those who are productive. We can note their characteristics, observe their mental habits, hang their intellectual wardrobe on the line. 105

Hutchinson's approach is essentially the process approach and he considers creativity to be insightful problem-solving behaviour. He has given an elaborate analysis of the following four stages of creative insight, viz. :

1. The stage of preparation ;
2. The stage of frustration ;
3. The period or moment of insight; and
4. The stage of verification.

He has given a diagrammatic representation of the interrelation of phases in the process of creative insight and supported the thesis throughout his book with suitable illustrations taken from his research data. It is noteworthy that he had the privilege of collecting information from such celebrated creative

persons as Bertrand Russell, Somerset Maugham, Arnold Bennett and Aldous Huxley. It is interesting enough to inspect the photostat copies of the questionnaires printed in that book.

Calvin W. Taylor (1964, p. 2) has pointed out that in about sixty or seventy years preceding 1950, merely " a trickle of research articles on creativity appeared in the scientific literature ". Guilford has mentioned that upto 1950 only 186 out of 121,000 topics listed in Psychological Abstracts dealt with creative imagination (Barron, 1969, p. 3). Barron (1969) has indicated that thereafter there has been a steady rise in the number of articles appearing in research literature and that by 1965 the Creative Education Foundation of America listed some 3,000 references which dated between 1950 and 1965. A more detailed analysis of the trend is given by Guilford (1970) in the *Journal of Creative Behaviour*, Vol. IV, No. 3, 1970, 149-157.

In India, we still find only " a trickle " of research literature on creativity. M. K. Raina's unpublished bibliography has listed only 176 references upto 1971. Similarly, doctoral theses submitted thus far in the Indian Universities on creativity are also

counted few.\* However, there seems to be a growing interest among researchers to probe into this area even though resources, particularly financial, are limited.

Research on creativity includes " all three areas: predictive characteristics, criteria of creativity, and variables that can modify the relation between the predictors and the criteria, such as education and training, working conditions, and other relevant environmental factors" ( C.W.Taylor, 1964, p. 13 ). Taylor has also indicated that the criterion problem is the most staggering problem and yet least attention has been paid by researchers to this technically most difficult thing which is " fundamental to the other topics". Anderson (1959) also has expressed very much the same view. Writing about the distinction between the criterion problem and the prediction problem, Taylor has commented as follows :

Criterion problem concerns the evaluation of the degree of creativeness of a product or a performance; it is quite separate from the prediction problem, in which the creative potential of people is estimated — for example, by means of test scores and in which predictions about future creative performances are made, based upon the " creative potential"

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\* Note : For detailed account see p. 146 , infra, the beginning paragraph of Chapter-III.

estimate for each person. 106

Brogden and Sprecher have given a summary of the theme of the Report of the University of Utah Criterion Committee of the Creativity Conference of 1959 in chapter 5 of the book Creativity: Progress and Potential edited by C.W.Taylor (1964). In that section, which deals with the problem of criteria of creativity, the authors have indicated that at the present state of knowledge, " the existence of multiple criteria of creativity should be recognized." 107 C.W.Taylor and Holland (1964) are not inclined to repose too much confidence upon tests of creative ability as criteria of creativity for the reason that they (the tests) " appear to be valid measures of the processes tested ( and so they) are at best preliminary and inadequate criteria." 108 The authors have cautioned that " if we rely on them extensively, we may overlook our chief criterion : adult creative performance" 109 ( underline mine). Towards the end of their chapter the authors have reiterated that " the use of scores on any particular test as a criterion

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106 Calvin W.Taylor in Calvin W.Taylor (ed.), Creativity: Progress and Potential, op.cit.,p. 9.

107 Ibid., p. 156.

108 Ibid., p. 16.

109 et seq.

of creativity is fraught with ... difficulties. Tests developed to measure creativity generally lack social relevance. Even if we can predict these test scores from other scores also designed to measure creativity, we are still faced with the problem of whether scores on these creativity tests have any real-life significance". Moreover, Stephen P. Klein (1967) has pointed out that the tests of creativity are "no more highly related to each other than they are to intelligence tests." 110

Kaoru Yamamoto (1966) has made a penetrating analysis of the problem. He is sceptical about the utility or validity of the creativity tests as efficient predictors of creativity. His thinking on the point is contained in the article entitled "Do Creativity Tests Really Measure Creativity?" appearing in the "tip" magazine 111 in its special number on "creativity". He does not find the position satisfactory in respect of validity of the creativity tests -- whether it is content validity, or criterion-related validity or construct validity.

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110 Stephen P. Klein, loc. cit., p. 23.

111 Kaoru Yamamoto, "Do Creativity Tests Really Measure Creativity", Theory into Practice ("tip"), V (No.4, Oct., 1966), 194-97.

Ghiselin (1963) also holds the view that the major drawback of creativity research is its lack of adequate criteria. He believes that "in lack of adequate criteria, judgment has been guided by impressions, and by rationalizations of impressions, mainly proximate criteria, thoughtfully developed and employed, yet uncorrected by those ultimate criteria which alone could assure their validity." <sup>112</sup> Moss and Duenk (1967) have similarly deplored "the absence of satisfactory criterion measures" and consider it to be the "major obstacle to research on creativity." <sup>113</sup> C.W. Taylor and J. Holland (1964) seem to share the above thinking and regard the use of psychological tests such as the Guilford Creativity Battery, the TAT and the Rorschach as criteria of creative performance to be usually reliable and immediate criteria, but with the reservation that "unless these criteria (test scores) predict actual creative performance, they provide erroneous information about the nature of creative persons and creativity." They, however, speculate that test scores as criteria may be helpful predictors

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<sup>112</sup> Brewster Ghiselin, op.cit., p. 30.

<sup>113</sup> Jerome Moss, Jr. and Lester G. Duenk, "Estimating the Concurrent Validity of the Minnesota Tests of Creative Thinking", American Educational Research Journal, IV, (No. 4, Nov., 1967), 387.

in respect of adult creative performance if they are supported by longitudinal studies. These authors also recommend that "studies of the characteristics common to creative performance in all fields are urgently needed."

Contrary to the general notion that some persons might be richly endowed with creative ability while it might be practically non-existent in others, psychologists and many art educators hold the view that all human beings possess that ability in some measure. It is also recognized that "creativity occurs at practically all ages, in some aspects of all cultures, and to some degree in all fields of human work and endeavour, although there are general differences in the frequency, level, and type of creativity across these categories" (C.W. Taylor, 1964).

Brogden, Holland, McPherson, Sprecher, C. Taylor and Torrance are the contributors in the symposium edited by Calvin Taylor and published under the title Creativity: Progress and Potential in 1964. Taylor has pointed out in his introduction to that book that all the contributors "assume that creativity emerges at the adult level as a complex result of many factors of both

inheritance and life history". And yet research effort is not merely confined to studies of creativity at the adult level. Literature abounds with material appertaining to developmental aspects of creativity right from childhood onwards, and considerable attention seems to have been paid to construction of creativity tests for various age-levels.

A perusal of the summaries of selected literature in psychology and psychiatry enshrined in the annotated bibliography entitled Creativity and the Individual edited by Stein and Heinze (1960) indicates that investigations have touched upon diverse areas such as the criterion and other problems, the creative process, heredity, the nervous system, age, early experiences, religion, cognitive factors, personality characteristics and motivational factors, psychopathology and other illnesses and statistical studies. Of all these the largest bulk is concerned with reporting on personality characteristics and motivational factors both in their theoretical aspects and empirical studies. The smallest section is on 'religion' which occupies only three and half pages containing the reports of merely three studies. This indicates the general trend of the research effort. Raina's bibliography (1971) reflects a similar trend obtaining in India with the difference that theoretical

matters are more abundant in Indian literature relating to creativity as compared to empirical studies.

The question, 'What is the relationship between physiology and creativity?', has, perhaps, not been attended with any great enthusiasm. Brown (1940) has speculated in his book Psychodynamics of Abnormal Behavior that male geniuses tend to be androgynous and female geniuses gynandrous in bodily characteristics. Berdyaev (1954) has argued that the Christ was androgynous " and that all creators must be so ..."(Barron, 1969, p. 105). There is no impressive account to support this position in any research investigations. However, feminine disposition is found to exist in highly creative men (Barron, 1969, p. 105 ), perhaps, because of affective overtone of creativity. It has, however, nothing to do with physiological characteristics.

Ashby and Bassett (1949) have reported the effect of leucotomy on creative ability. In their investigation they had formed three groups of 25 adults each. One group consisted of leucotomized mental patients and another group, which was closely matched with leucotomized patients, was also composed of psychotics. The third group was composed of normal individuals. Upon

the administration of a drawing test and subsequent comparison of the scores " the investigators found that the normal subjects had significantly higher scores on accuracy and creative ability" as compared to the clinical groups and that there was no significant difference between the leucotomized group and the other psychotic group on creative ability scores. The investigators concluded that "psychosis, alone, causes a deterioration of creative ability; leucotomy, per se, has no effect." The same investigators had reported earlier (i.e. in 1948 ) a similar finding on the basis of their observations on leucotomized patients on whom other psychological tests, such as the Rorschach and write-a-story test were also administered. Reitman(1947) reported two cases of leucotomized schizophrenics and furnished a theoretical explanation for the similarity between surrealist art and psychotic art. He believed that " the art of great artists reflects their sub-conscious, but in the psychotic, the subconscious speaks directly, and its unusualness may not bar it from being called true art."

In their reductionistic approach, Brain (1948) and Gerard (1948) have advanced theoretical propositions

to furnish physiological explanations for creativity. Brain believes that "intelligence and power of expression enable the genius to utilize the 'nervousness' which makes an ordinary man neurotic". Brain also believes that in the genius the functional patterns of nerve cells, which he calls "schemas", are more complex. He also believes that the presence of high emotion in the work of literatures "suggests that the basal structures of their brains must be richly developed."

In this context a more recent reference might be worth mentioning. Outlining his theory of non-verbal creativity Charles C. Anderson (1968) has regarded scientific and mathematical creativity as a function of a set of psychophysiological characteristics. He writes :

The most important of these (psychophysiological characteristics), which is necessary and sufficient for non-verbal creativity, is seen to be a slight dominance of hippocampal or cortical inhibitory activity over reticular, or cortical arousal, activity .... To the extent that the verbal centers in the dominant cerebral hemisphere are highly developed in early childhood, the corresponding interpretive centres in the non-dominant hemisphere are undeveloped. These two physiological relationships have observable psychological counterparts in the taciturn, non-communicative person demonstrating non-distractible concentration and susceptibility to mental fatigue and temporary impairment, all

characteristics of the non-verbally creative person as illustrated historically. 114

Anderson has quoted Watson (1928,p.100) according to whom this taciturnity might have resulted because the non-verbal creators might have imitated their parents' taciturnity in their childhood or that the parents might have been censoring their verbalizing during those childhood days. Anderson says that according to the theory of Dollard and Miller (1950), the taciturnity of childhood could perpetuate the temper tantrums, fears, rages and dependencies of early childhood and that according to Razran (1961) these characteristics would have "autonomic resonance leading to nameless interoceptive and proprioceptive experiences of which the subject is unaware". Anderson continues that "irritability, even hostility, are reactions disproportionately characteristic of unidentified creative groups (McClelland, 1963, p. 1965) and creative individuals like Newton (More, 1934, p. 97), Faraday (Growther, 1936, p. 73), Pasteur (Vallery - Radot, 1922, p. 325 )

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114 Charles C. Anderson in microfiche, No. ED 025814:  
 " A Theory of Non-Verbal Creativity" (U.S.  
 Department of Health, Education and Welfare,  
 June, 1968). Summary part.

and even the otherwise saintly Maxwell (Campbell and Garnett, 1882, p. 430)\* 115

Anderson's paper provides rich information about numerous findings of brain surgeons and their consequent speculations about such things as the activation of the hippocampus and its relationship with taciturnity, memory impairment ( or "arrest" reaction), fertility and eroticism\* etc. Of them Penfield's findings and speculations seem to be of immense value. To quote from Anderson :

" ... Penfield (1965) speculates developmentally about the functionally "uncommitted" cortex in each hemisphere as compared to the sensory and motor cortices which are "committed" from the start of life. When the child is still an infant, the " ... area of temporal cortex that is to be used for speech is interchangeable with that to be used as interpretive cortex" (Penfield and Perot, 1963). As the child ages, however, certain areas of the uncommitted cortex are exclusively devoted either to the function of speech or to the function of interpreting experience. An assumption, usually tacit, in all this is that there is a reciprocal relationship between the amount of the left hemisphere used for speech and the amount used for the interpretation of experience...". 116

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115 Ibid.

\* Note : Erotism was evidenced by 'partial erection' and grooming of the genitalia (McLean's hypothesis 1965). Cf. Rollo May's account of "a peculiar sexual feeling" reported by his potentially creative patient precisely during every "abortively creative moment" (Rollo May, "The Nature of Creativity" in Harold H. Anderson (ed.), op. cit., pp. 59-60

116 Ibid., p. 6.

Anderson infers from this "that the less speech is indulged in, the larger the area of the cortex devoted to interpretation." This phenomenon accounts for the connexion between taciturnity and non-verbal creativity as also for "the relatively low small number of females who are non-verbal creators (McClelland, 1962, p. 144)". Penfield's findings have also demonstrated that "the entrencephalic system provides a neuronal record, like a tape recorded or strip of film, on which are registered past events to which an orienting response has been made (Penfield and Roberts, 1959), (which is ) the indispensable memorial basis of non-verbal creativity." So much about the psychophysiological investigations. The foregoing account is, however, only sketchy.

The ETS annotated list of 'Research on Creativity' gives brief accounts of 43 studies including some which are under progress. No study reported therein is related to psychophysiological investigation. The studies are reported for the period 1953-1970. Raina's bibliography also does not list any psychophysiological investigation done in India. ETS list gives references of 5 studies conducted on the evaluation of creativity on the basis of characteristics of the creative products. This indicates a stride in the direction of resolving the criterion problem.

It is seen that a considerable proportion of research on creativity deals with construction and standardization of creativity tests for children and adolescents as also correlational studies involving creativity tests and other ability tests. Such work is again, by and large, confined to non-adults.

So much about general issues of crucial importance.

Since this investigation has set its goal to studying adult creativity, the research review presented below would be confined now to that aspect.

Of the 43 ETS studies mentioned above there seems to be a solitary study on adults: the 'Life History and Ability Correlates of Mechanical Ingenuity.' That study examined the predictive validity of certain tests of mechanical ingenuity as well as the concurrent validity of various measures of interest, backgrounds, and personality dimensions thought to be related to scientific creativity. The sample consisted of 528 engineers. In that study life history, patents, publications, etc. were found to have considerable predictive validity. Factor analysis revealed drive, independence, research

orientation and positive home and educational background as contributors to prediction. "The findings supported the general position that a creative act is not a function of a single trait or ability, but is a phenomenon that is probably based on a series of relatively independent types of variables" (S.P. Klein and W.A. Owens, Jr. 1965).

Brozek (1951) has pointed out that the review of studies of Visher, Lehman and Adams suggests "that for many men, their most creative work comes in later years—the forties and beyond" (Stein and Heinze, 1960).

Clague (1951) has indicated that a statistics survey comprising 41, 737 scientists revealed that professional ability and productive capacity of highly trained scientists of America did not appear to decline until the age of 60 (Stein and Heinze, 1960).

Dennis (1956) studied the relationship between age and productivity among scientists. His sample comprised 100 heptagenerian scientists of the 19th century. The group included scientists from diverse fields such as astronomy, chemistry, geology, mathematics, physiology, physics, etc. All were persons of recognized eminence. In that investigation it was found that the

peak period in terms of number of publications was between ages 30 and 59 on an average (Stein and Heinze, 1960).

In a similar study Lehman(1953) was concerned with the relationship of age and the most important or creative contributions of persons from various fields. In that study Lehman concluded "that superior creativity generally rises rapidly to its highest point in the thirties and declines slowly thereafter". He further concluded that "in the fields that require new learning and unlearning of the old, older people are handicapped, while in situations requiring an accumulation of past knowledge, they are at an advantage" (Stein and Heinze,1960). Lehman's investigation (1958) relating to the chemists' most creative years led him to conclude that "the maximum production rate for contributions to their field was achieved between the age of 30 and 34, inclusive". Data for the study were obtained in respect of 2,466 chemists from 44 histories of chemistry. He also found that the age range of greatest proportion of their very best production was 25 to 39 years. Essentially, there is no conflict between the findings of Lehman and those of Dennis since Lehman was concerned with outstanding creative works of scientists while Dennis was concerned with their mere quantity of production (Stein and Heinze, 1960).

Rossman (1935) studied creativity of 710 inventors with the help of their patent records. He found that 61 per cent of first inventions were made before the age of 25. He also found that the most active period of patenting was 25 to 29 years of age and that the average age for completing the most important invention was 38.9 years. Another interesting thing that he found was that college education was slightly advantageous to inventors in respect of intensity of inventing. (Stein and Heinze, 1960).

Stevens (1951) has corroborated Lehman's findings in his own studies that the creativity of scientists declines after age 40 (Stein and Heinze, 1960).

The foregoing studies summarised from Stein and Heinze (1960) give an impression that the peak-- age of creativity is generally during the thirties of the innovator.

Such large-scale parallel studies remain to be undertaken in India as yet.

The studies conducted by Catherine Cox (1926) and those by Ellis (1904) and Raskin (1936) follow the 'historiometric' method and the statistical. The historiometric method was used by Terman (1917) in his

study of Galton also. This method derives its source-material from biographical literature and other documents. Cox Catherine studied the early mental traits of 300 geniuses, and one of the three conclusions that she arrived at was that "youths who achieve eminence are characterized not only by high intellectual traits, but also by persistence of motive and effort, confidence in their abilities, and great strength or force of character ...." Ellis' study of British genius comprised of 1030 eminent persons selected from the Dictionary of National Biography. Ellis used the word genius to signify high intellectual ability. The study was aimed at identifying the main anthropological and psychological characteristics of the most eminent British people. He concluded that the determining factors of genius are numerous. Ellis, however, regarded the following conditions as highly favourable to the development of genius :

1. The parents' great reproductive activity ;
2. Being the youngest or the eldest child ;
3. Being of feeble or ill-health in childhood ;
4. Clumsiness or lack of muscular coordination;and
5. The stock of contact with a strange and novel environment acting as a powerful stimulant to the nascent intellectual aptitudes.

Raskin made a comparative biographical study of eminent scientists and men of letters of the 19th century and for this data was gathered from the Encyclopaedia Britannica and five biographical dictionaries. In addition, individual biographies were also consulted wherever necessary. In that study 120 scientists and 123 literary men comprised the population. Among other findings the following conclusion was drawn in respect of temperamental traits :

Emotionality, despondency and egotism were more frequently reported for literary men than for scientists; ... Men of letters ... showed a definitely marked tendency toward instability, a higher incidence of ill health in childhood and maturity, a higher incidence of tuberculosis and a slightly shorter life-span. For scientists the data indicate greater sociality, cheerfulness and modesty. (Stein and Heinze, 1960, p. 395 )

Of the several empirical studies reported by Stein and Heinze (1960) in the section dealing with personality characteristics and motivating factors, the study of Drevdahl (1956) on the identification of factors of importance for creativity, and the study of White (1931) on the versatility of genius seem to be highly comprehensive in coverage. In White's study the subjects were the same 300 eminent persons previously studied by Catherine Cox (See p. 125 , supra ).

The study did not lead to any conclusion as to which particular kinds of genius were most versatile, but it was indicated that the musicians, the artists and the soldiers were among the least versatile. In the same study, the following well-defined clusters of abilities were revealed :

1. The scientific, comprising science, mathematics, medicine, hand work, and possibly art.
2. The literary, comprising novels, drama, poetry, and perhaps non-fictional prose.

The following two less well-defined clusters were also revealed :

1. The scholastic, comprising philosophy, social theory, history and languages.
2. The administrative, comprising politics, warfare and business.

" No evidence was found for an esthetic cluster".

" The musicians did not fit in any cluster".

Drevdahl's subjects were graduate and advanced undergraduate students in the sciences and arts of the University of Nebraska. The tools employed in the study consisted of Cattell's 16 P.F. Questionnaire, Thurstone's P.M.A. Test, and tests selected from Guilford's Factor Analytic Study of Creative Thinking. The sample consisted of 64 subjects in the analysis of intellectual factors

and 52 subjects in the analysis of personality factors. Each subject was rated by two raters, employing a seven-point scale of creativity. The raters were chosen from the faculty-members who had supervised the subjects in their area of specialization.

The conclusion deduced by Drevdahl was as follows :

In terms of these results we might characterize the creative group as somewhat withdrawn and quiescent, more concerned with ideas and things than with people. ... it appears that suspiciousness and interest in the internal mental life, or possibly interoceptiveness, may be associated with creativity in arts, but that trusting attitudes and interest in external things or exteroceptiveness, may be associated more with creativity in the sciences.

In other words, as Stein and Heinze have put it, " the art group as a whole scored significantly higher than the science group as a whole on the following variables : emotional sensitivity and bohemianism." Later, in his investigation R.B.Cattell (1963) also reached the same conclusions.

Torrance (1962) surveyed a large number of studies and compiled 84 separate characteristics which discriminated between creative and non-creative subjects.

Taylor and Ellison (1964) identified self-

-sufficiency and low sociability as the scientists' personality characteristics while Getzels and Csikszentmihalyi (1964) arrived at a similar conclusion in respect of art students.

Barron (1963) has repeatedly found that his creative subjects "prefer complexity and some degree of apparent asymmetry in perceptual phenomena. Their judgment tends to be independent and highly resistant to group pressure," (Encyclopaedia of Educational Research, Fourth Ed.). In his investigations Barron used the Barron Welsh Art Scale, the Myers-Briggs Type Indicator and the Simplicity-complexity Scale.

McClelland (1963) suggested that an important characteristic of a creative individual is his willing to take risks. This agrees with Barron's finding that creative individuals prefer complexity, are independent and highly resistant to group pressure (Encyclopedia of Educational Research, Fourth ed.).

Gough and Woodworth (1960) conducted an interesting research study to determine the distinct personality styles of research scientists. The sample consisted of 45 industrial research scientists. The method of investigation was the Q-technique in which 56 diagnostic statements were used. The investigators identified eight

different research styles as a result of this study ( L.C.Repucci in Gary A. Davis and Joseph A. Scott, (eds.) 1971; Barron, 1969, pp. 98-101 ).

In a study conducted by V.Lowenfeld (1952) eight key characteristics of creative persons were determined. These findings were later confirmed by Guilford (1954, 1956, 1957). These characteristics were found to be :

1. Sensitivity ;
2. Fluency ;
3. Flexibility ;
4. Originality ;
5. Redefinition skill ;
6. Ability to abstract;
7. Ability to synthesize;and
8. Coherence of organization.

Charles H. Vervalin (1962, reprinted in (eds.) Gary Davis and Joseph Scott, 1971) gives the following "canned" listing of the creative person's characteristics as revealed by research :

1. High level of intelligence (intelligence here being broadly defined).
2. Openness to experience.
3. Freedom from inhibitions and stereotype thinking.
4. Esthetic sensitivity.
5. Flexibility in thought and nature.

6. Love of creation for creation's sake.
7. Independence in thought and action.
8. Endless quest for new challenges and solutions.

Roe (1946, 1951, 1952, 1953) has conducted several studies comprising separately the artists, the biologists, the psychologists and the anthropologists. Her findings about the personality characteristics of creative persons agree as well as conflict with others' studies.

Numerous studies have been conducted in diverse areas such as the sciences, the arts, the technological subjects like architecture, engineering etc. Many studies have employed clinical methods and used projective techniques like the Rorschach, the TAT etc. But a most comprehensive study of recent years, which has dwarfed all others perhaps in respect of its enormous magnitude and range, is that of the Institute of Personality Assessment and Research of the University of California at Berkeley. In that study 530 creative persons representing the fields of writing, architecture, physical science research, engineering and mathematics were involved as subjects. These creative persons were nominated by experts on the criterion of indisputable creative capacity ( Vervalin in G. Davis and J. Scott, 1971). Barron (1969, p. v. ) has indicated that " the

method of study employed there ( at Berkeley ) was originally not a research method at all. Rather, as the word assessment implies, it was a way of appraising persons..." The method employed a combination of interviews, situational tests, standardized questionnaires and projective techniques. The Q-sort was also employed. All this was achieved by what is known as the "living-in assessment" method in which the subjects were invited to stay with the "assessors" in or around the Berkeley campus for 3 days, taking tests. The assessment method being very comprehensive and novel in form, Barron is being quoted below in order to have a clear picture of it :

Each "assessment" in the creativity researches brought together at least five distinguished practitioners in the professions chosen for study. More commonly, 10 such persons participated. The senior staff consisted of ~~six~~ or seven psychologists and usually one or two psychiatrists or analysts who conducted the life history interviews. A single "assessment" generally ran from Friday through Sunday, and took place in a large, comfortably furnished, former fraternity house located on a pleasant tree-lined street of such houses on the edge of the Berkeley campus. In the early days of the Institute the subjects and staff members slept in on Friday and Saturday nights, and of course took all their meals in the house and in general made it a comfortable place of residence for the week-end. A wine cellar and a fireplace added to the amenities, and in as many ways as possible the situation was defined not as test-taking but as a mutually

open situation in which staff and subjects could get to know each other.

... what the staff did at the end of the three days was this: each senior staff member wrote down all his impressions of each subject as accurately and tersely as possible, and finally employed a 100 item set of sentences, each of them representing a clinical inference, to describe the subject in somewhat more technical and psychodynamically "deeper" terms. The Gough Adjective Checklist (Gough, 1960) was used for this first task, and the Block Clinical Q-sort (MacKinnon et al., 1961) for the second.

These descriptions were given without knowledge of test results and were intended to represent what could be observed from the subject's actions and words during the three days. The full intuitive capacity of the staff observer was thus called into play, and eventually also was brought to bear on each case through the medium of a case conference and final case write-up, with test results and interview data taken into account as well. Finally, when all cases in a given sample had been studied, they were rated relative to one another on a set of 40 personality traits, based largely on the earlier conceptual formulations of Murray and of Gordon Allport (1937). 117

Barron (1969, pp. 101-102) has pointed out that inspite of the fact that the investigators have employed various different techniques in their researches and have also used somewhat different terminologies, there appears to be a consistent agreement in their findings. He has suggested that "if we take a combination of

researches of A. Roe, C.W. Taylor, R.H. Knapp, R.B. Cattell, R.D. MacCurdy, D.C. McClelland, B. Eiduson, J.A. Chambers, and H.G. Gough ... this unified picture of the productive scientist emerges :

1. High ego strength and emotional stability.
2. A strong need for independence and autonomy; self-sufficiency; self-direction.
3. A high degree of control of impulses.
4. Superior general intelligence.
5. A liking for abstract thinking and a drive towards comprehensiveness and elegance in explanation.
6. High personal dominance and foreefulness of opinion, but a dislike of personally toned controversy.
7. Rejection of conformity pressures in thinking (although not necessarily in social behaviour).
8. A somewhat distant or detached attitude in interpersonal relations, though not without sensitivity or insight; a preference for dealing with things or abstractions rather than with people.
9. A special interest in the kind of "wagering" which involves pitting oneself against the unknown, so long as one's own effort can be the deciding factor.
10. A liking for order, method, exactness, together with an excited interest in the challenge presented by contradictions, exceptions, and apparent disorder.

Vervalin (1962 in Davis and Scott, 1971) has listed 13 qualities of creative persons culled out from the

Berkeley studies. He has, however, pointed out that Berkeley research indicated that there is no clear stereotype of the creative individual. Barron(1969) has stressed the need of search for "types" of creative individuals along the lines of work done by Gough.

Eiduson (1957, 1958) in her work on artists, MacKinnon (1961) on architects, Eiduson (1962) on scientists, Raychaudhuri (1961,1962 and 1963) on musical artists and Hammer (1961) on artists indicate consistency in respect of certain motivational and personality factors common to them all. They are : sensitivity, wide spectrum of interest including feminity, emotional involvement with their work, non-conformity and love for originality, withdrawal tendency in interpersonal relations and high ego-strength. Raychaudhuri (1966) speculates that " inspite of the factual evidence for a considerable variation within the creative person, variation so wide as to encompass both highly desirable and undesirable personality dimensions, there may be a creative personality organization, the integration and dynamics of which is yet unknown".<sup>118</sup> Hinton <sup>119</sup>(1970)

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- 118 Manas Raychaudhuri, "Creativity and Personality", Indian Psychological Review, II (No.2,Jan.1966),100.
- 119 Bernard L. Hinton, " Personality Variables and Creative Potential", The Journal of Creative Behaviour,IV (No.3, 1970), 216.

has also concluded that " a relationship does exist between the personality profile and the creativity of an individual".

In an investigation to explore the relationship between originality and personality style, Barron(1954) conducted his study with a sample of 343 military officers as subjects. The instruments used in the study were a series of tests taken from Guilford's originality assessment battery and also some perceptual-cognitive tasks. Later, 100 of the officers were further tested for 3 days in the living - in assessment system and in that, in addition to personality tests, situational tests and some other tests administered on them, they were also rated by observers by the Q-sorts and trait ratings. The findings indicated a positive relationship between originality and "scope-and-complexity" as a person. A low positive relationship was also found between originality on the one hand and impulsivity, scepticism, daring and expressive dispositions on the other.

Another similar investigation was carried out by Barron (1955) with 100 captains of the U.S. Air Force, this time using a battery of eight tests of originality,

the Barron-Welsh Art Scale, the CPI-Social Dominance Scale, the CPI-Impulsivity Scale etc. In that investigation it was found that originality was positively related to independence of judgment, personal complexity, preference for complexity in phenomena, self-assertion and dominance, and rejection of suppression as a mechanism for the control of impulses.

S.S.Bloom (1955) selected his sample of highly creative chemists and mathematicians with the help of nomination done by panels of persons of these fields. A second group matched in respect of experience and education, but not for creativity, was also selected for the contrastive study. No significant differences were found between the groups in respect of aptitudes, problem-solving habits or perceptual-cognitive habits. Use of projective tests revealed the following personality and temperamental characteristics frequently associated with more creative individuals, viz.

1. A high degree of energy channelled into productive research efforts.
2. Some difficulty in establishing warm and friendly relations with other people.
3. A sense of need for retreat from the social world to a world of ideas and objects.  
(Cf. Roe, 1963).

The foregoing three studies have been reported in the "Compendium of Research on Creative Imagination" in the book : A Source Book for Creative Thinking edited by Parnes and Harding (1962).

Quoting C.W.Taylor, Taher Razik (1966), who has himself also compiled a bibliography of creativity, has warned that " research in creativity is in an early stage and no single characteristic can account for the total creativity process". He has, however, indicated that research findings, in general, have provided a "working model" of the creative person as embodying the following characteristics :

1. The creative person shows originality in a variety of ways.
2. Independence of judgment is a strong trait of the creative person.
3. A sense of humor is another characteristic of the creative person.
4. The creative person shows great curiosity about many things.
5. The creative person shows an unusual sensitivity to problems, situations and qualities of his experience (i.e. openness of experience in Roger's theory).

6. The creative person has a strong liking for autonomy.
7. The creative person has a purpose and a goal and a capacity to concentrate completely on a task.
8. The creative person shows flexibility and spontaneity in his disposition, in his willingness to take calculated risks.<sup>120</sup>

In respect of sexual identification and interests, tests of masculinity-femininity have revealed that "highly creative men tend to get high scores on femininity scales, and highly creative women on masculinity scales. Such men are more sensitive than most and have higher aesthetic interests; such women are more interested in things and ideas than other women" (Anne Roe, 1963).<sup>121</sup> Roe (1963) has observed elsewhere again that "the more intellectualized the male or female, the more likely the person is to get placed on masculinity-femininity scales at the opposite pole from most others of the same sex"<sup>122</sup>

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- 120 Summarised from Taher Razik in Creativity number of Theory into Practice, V. (No. 4, Oct., 1966), 163-164.
- 121 Anne Roe, "Psychological Approaches to Creativity" in Myron A. Coler (ed.), Essays on Creativity in the Sciences (New York: University Press, 1963), p. 169.
- 122 Anne Roe, "Personal Problems and Science" in Calvin W. Taylor and Frank Barron (eds.), Scientific Creativity (New York: John Wiley & Sons, Inc., 1963), p. 136.

Roe ascribes it to high degree of sensitivity ( an attribute which is regarded feminine in most cultures) required in scientific and other more intellectual pursuits. MacKinnon(1962) considers this to be a form of openness to experience - one of the most striking characteristics of highly creative individuals. In this context he says as follows :

On a number of tests of masculinity-femininity, creative men score relatively high on femininity, and this despite the fact that, as a group, they do not present an effeminate appearance or give evidence of increased homosexual interests or experiences. Their elevated scores on femininity indicate rather an openness to their feelings and emotions, a sensitive intellect and understanding self-awareness, and wide-ranging interests ... and these traits are observed and confirmed by other techniques of assessment.<sup>123</sup>

In terms of Jung's typology, MacKinnon (1966) has pointed out that the Berkeley studies have shown that two-thirds or more of each of the creative groups which participated in the investigation showed a clear tendency toward introversion. He further observes that "whether introvert or extrovert, the creative person is an impressive person, and he is so because he has to

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123 D.W.MacKinnon, "What makes a Person Creative" in Theory into Practice, V(No.4,1966), 154.

such a large degree realized his potentialities." <sup>124</sup> In terms of Jungian functions, MacKinnon has indicated that the creative artists show a preference for feeling, scientists and engineers a preference for thinking, and architects are divided on either of these two. It is also found in these research studies that between perceiving (awareness of something) and judging (coming to conclusion about something) the balance is more tilted towards perception in respect of creative persons. MacKinnon believes that this is again a form of their openness to experience. Barron (1969, p.75) has very much to say the same thing. R.B. Cattell (1955, 1963) also concluded that the creative is a self-sufficient introvert. Guilford (1966), using the Myers-Briggs Type Indicator, arrived at the same conclusions. Barron (1963) found that creative persons have a preference for complexity and they show high degree of tolerance for ambiguity.

Incidentally, it may be of some relevance to review very briefly what Carl Rogers has postulated about creativity. In his theory, Rogers regards creativity as emanating from "man's tendency to actualize himself, to become his potentialities." <sup>125</sup> He regards the following

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124 Ibid., 155.

125 Carl C. Rogers, op.cit., p. 72.

three inner conditions as most closely associated with creativity :

1. Openness to experience or extensionality :

This is the opposite of psychological defensiveness because there is no distortion for the sake of protective mechanism. Perception is also not limited to pre-determined categories such as tree is green, modern art is silly. Extensionality may be characterized by such new categories as tree is lavender, modern art is powerful etc. This openness to experience means tolerance for ambiguity. <sup>126</sup>(William J.J. Gordon's method of "Synectics" <sup>127</sup> deliberately involves the following processes for the sake of generating creative solutions to problems :

- (a) making the strange familiar  
(Cf. Déjà vu experience)
- (b) making the familiar strange  
(Cf. Jamais vu experience)

2. An internal locus of evaluation :

This means that the source of judgement is internal. This corresponds with the "eureka" feeling.

3. The ability to toy with elements and concepts :

Associated with the condition of openness, it is the ability to play spontaneously with ideas, colours, shapes, relationships, etc. in the prelogical fashion.

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126 Cf. Barron and MacKinnon, p.140-41, supra.

127 William J.J. Gordon, "Synectics" in G.A. Davis and J.A. Scott (eds.), Training Creative Thinking (New York : Holt, Rinehart and Winston, Inc. 1971), p. 22.

This investigator feels that "openness to experience" coupled with "the ability to toy with elements and concepts" should constitute the characteristic curiosity and spirit of adventure of the creative person. Similarly, the second postulate should be accounting for the feeling of involvement or total identification of the creative person with his creative pursuit and product.

On close examination it seems apparent that Rogers's self-actualization theory can be tested by the type-psychological approach of C.G.Jung.

Incidentally, it may be of interest to see what research studies have offered in respect of the following two aspects, viz. :

1. the role of inheritance in creativity, and
2. incidence of insanity in creative people.

In respect of the first problem Barron conducted a study at the Institute of Medical Genetics in Florence and the Mendel Institute in Rome around 1968-69. The subjects consisted of 59 pairs of like-sexed twins : 30 pairs being monozygotic (identical) twins and 29 pairs were dizygotic (fraternal). The average age of the subjects was 17. Diagnosis of zygosity was done by medical methods.

Instruments used for the study were Gottschaldt Figures for Adaptive Flexibility and Barron-Welsh Art Scale for Esthetic Judgment. Intraclass correlation in the identical twins was compared with the correlation in the fraternal twins in respect of these two factors. The study seemed to indicate the possibility of inheritance of these two factors which are considered important to creativity.

With regard to the second question (i.e. of incidence of insanity in creative people ), the evidence collected from the MMPI measures in respect of writers and architects of the Berkeley studies points up<sup>that</sup> "the creative groups consistently emerge as having more psychopathology than do the more representative members of the same profession. (Barron, 1969, p. 72).\*" In a less systematic study made by Geertzel and Goertzel (1962) "the incidence of psychosis was found to be considerably lower among the eminent, although eccentric behaviour and various forms of behavioural pathology other than psychosis, including suicide, are much more common." Earlier, Havelock Ellis (1904) who had studied the biographical accounts of nearly 1000 eminent persons of

\* Note: Rollo May (1959) has given a dramatic description of an event showing Adler's oversimplification of the compensatory mechanism theory of creativity and its absurdity (See Rollo May in Harold Anderson (ed.), op.cit., p.56).

Britain objectively and statistically, came to the conclusion that incidence of psychosis was comparable in both eminent persons and the general population. (Cf. Barron, p. 144 , supra ).

After reviewing creativity research conducted in the cognitive and personality domains, Dallas and Gaier (1970) have reported that despite differences in age, cultural background, area of operation or eminence, a particular consistent patterning of psychological traits is discernible. The authors have pointed out that creative persons can be distinguished better in terms of their interests, attitudes and drives, rather than by intellectual abilities. They have further suggested that creativity research pursued on the basis of compound criteria from disparate psychological levels may present more valid findings, and contribute to the resolution of conceptual dilemmas (Psychological Bulletin, 1970, 73 (1), 55-73 in the Psychological Abstracts).