

counting of publications and reports; official records; and membership of professional organisations. His factor analysis separated 27 factors. His results indicated that among the many correlations four out of five variables appeared independent of a given criterion. This demonstrates to us the overwhelming complexity of the criterion for creativity.

Measurement as Criteria :

The development of tests which could be used as criterion was influenced by Chassell's (1916) publication. The types of tests have in general not changed much during the last half century, but the methods of evaluating the data have become much more complex. Guilford, for example, used factor analysis in order to redefine the structure of the intellect. In one of his more recent revisions in "Intelligence: 1965 model" Guilford (1966) mentions his 1958 model of the intellect on which he made certain improvements. He presents us with a "unified theory of intellect" making use of a cubical model of intellectual abilities in which each dimension represents a mode of variation among the factors. His structure-of-intellect model, has 5 operation categories (cognition, memory, divergent production, convergent production, and evaluation), is intersected by 4 content categories (figural, symbolic, semantic and behavioural), in turn intersects 6 product categories (units, classes, relations, systems, transformations and implications). This model was designed in 1958. His 1965 model is an operational for problem

solving or creativity in general. Guilford emphasized Structure Theory Concepts in his model which was built up from new research and theorizing. He represents his model in a figure. Guilford (1966) does not consider that this model will be the final one, but sees it evolving so that intelligence can be integrated into a general psychological theory, thus giving intelligence a thorough psychological-theory foundation. Guilford considers the lack of psychological knowledge in the field of creativity to be due to the inappropriateness of the SR model for the study of higher mental processes.

Keeping his model in mind Guilford (1966) suggests a trait approach for creativity and assumes that the discovery of dependable trait concepts lies with factor analysis. He places creative ability in the context of the structure of the intellect. The factorial traits that are related to creativity are described by him as: ability to see problems, fluency of thinking (e.g. word and ideational fluency), flexibility of thinking (e.g. spontaneous and adaptive flexibility), originality, redefinition, and elaboration. The types of cognitive abilities which Guilford assumes as important for creativity can be noted in his test development. His measuring devices ask for the detection of defects or deficiencies in common implements or institutions; the individual has to mention words which contain a specific letter or a number of letters. In another test,

as many synonyms as possible for a stimulus word have to be produced in a certain time.

Other tests concentrate on the production of phrases or sentences; or the subject has to mention as many objects as possible with certain properties; or to note a multitude of uses of a common object. Concerning the fluency factor Guilford concentrates on quantity and not on quality of responses. In other tests the subject has one or two simple responses to produce which link into a complex unit.

Guilford (1959) measures the trait of originality in three different fashions: 1) quantity of responses that are clever; 2) the use of remote association items, and 3) weighing items in proportion to their infrequency of occurrence in a population. At least the first two procedures need a quality criterion.

Guilford and his associates have concentrated their research on the definition of factors by isolating patterns of concomitant variations (Guilford, 1957; Guilford, Kettner, & Christensen, 1954, 1956; Kettner, Guilford, & Christensen, 1959). The studies can easily be put into two groups: 1) studies which indicate relation between measures of factors and criterion, and 2) studies which indicate no relation between measures of factors and judged creative ability.

Barron (1956) used three of Guilford's tests, Unusual Uses, Consequences, and Plot Titles, and found correlations ranging from .30 to .36 with the judges' ratings of originality.

Similar results were reported by Chorness (1956) between scores on the Guilford tests and United States Air Force student-instructors' ratings of creative expressions. Drevdahl (1956) found no significant differences between groups rated as creative or not creative on factors of re-definition, closure, ideational fluency, associational fluency, sensitivity to problems, spontaneous flexibility and originality. Similar negative results are indicated by Gerry, DeVean, and Chorness (1957) who noted no significant differences between Guilford's creativity tests and awarded and unrewarded employees when the groups were studied in conjunction with intelligence, job performance, and educational qualifications.

Research at the Institute of Personality Assessment and Research, at Berkeley, California which concentrated on creative people (Barron 1965) mentions that all groups studied on Guilford's battery of creativity tests, which were scored for quantity or quality, correlated low with degree of creative ability as judged by experts in the subjects' own fields. Gough's (1961) results substantiated Barron's report. The correlations between criterion ratings of creative ability and some of Guilford's tests were:

Unusual Uses (quantity - .05, quality .27); Consequences (quantity - .27, quality - .12); Matchsticks (.04); and Gestalt Transformations (.27).

The tests known as Minnesota Tests of Creative Thinking have been devised by Torrance and his associates and described and evaluated by Goldman (1964). Torrance has moved away from Guilford type tests, some of which he modified, to tests of a more complex character which set out by contrast to test several factors of creative thinking. Torrance used these tests to replicate eight experiments on the Getzels and Jackson procedure to investigate the relationship between creativity and intelligence.

The Minnesota Tests are valuable in the identification of creativity and in relating this back to performance in other more conventional tests and to academic achievement. They also concentrate upon periods in the subject's life history when the sequence of events might have had an inhibitory effect. These tests are, however, difficult to score but their coefficients of reliability and validity should yield better results in the future.

2. The Creative Individual

The world is increasing in complexity, and society cannot afford to neglect or destroy potential human resources. Therefore the development of creative potential is now viewed as an educational goal, not only important to the individual but also, which is even more important, to society. A handicap in the development of creative potential is the widespread opinion that creative people are not easy to get along with, they are supposed to be egoists,

nonconformers and do not care about the thoughts and feelings of other people. Therefore it is assumed that if creativity is too much broadcast it will raise havoc within our society.

In order to understand the relationship between society and its creative individuals some questions come to the fore. Are all creative individuals mal-adjusted? Must a creative individual sacrifice satisfying and truly human relationships? Are the problems of the creative individual within the person or of social origin? Is the creative individual the maker of his own difficulties, or is the society in which he lives partly responsible for it?

It is true that many creative persons seem to have difficulties in their relationships with other members of the society. Frequently they can be traced back into childhood to parent - child conflicts; they sometimes continue on other levels of interpersonal relationships, and in rare cases they may result in withdrawal.

Many researchers have looked into this problem. Barron(1963b) studied creative writers and found them to be effective people with proud and distinctive behaviour. He noted that at times they exhibited pain or withdrawal, and frequently, protest, in their interactions with others. Knapp (1963) believes that the creative scientist is disposed to distantiation,

and is apt to use repression and isolation in emotional reactions to others. Drevdahl (1956) the creative student in the arts and sciences relatively withdrawn and quiescent, with little in people but more interest in objects and ideas. Bloom (1963) concluded that the creative mathematician and chemist needs to retreat into a world of ideas and objects, and therefore has some trouble establishing friendly relations with other people.

The longing to withdraw was also noted (1953). Her investigation demonstrated that psychologists and physicists created ways of being alone. She noted that more than half of the social scientists in her study behaved with open hostility and rebellion against the common pattern of parental control and overprotection in their youth. This feeling still lingered on into the present. Stein's findings were similar concerning the creative person.

MacKinnon (1959) in one of his reports demonstrated that creative research scientists felt lonely at home and at school. Getzels and Jackson (1958) in their extensive study noted that teachers preferred the high IQ student to the highly creative student even if the latter's achievements were of a higher standing. Torrance (1963) reports similar findings in testing elementary school children and found that in peer relationships the highly creative-high IQ

student tended to have fewer friends than the high IQ-low creativity student.

Other researchers found a difference in the social behaviour of the creative person. According to Drews (1961) the creative adolescent is humanistically oriented and empathic but not especially sociable. Burkhart (1960) found that most highly creative high school and college students, rated high on social maturity, liberalism and non-authoritarianism. Weinberg and Springer (1961) on the other hand, found the creative person not excessively independent or rebellious, but showing a willingness to follow the lead of his parents. An important study by Watson (1960) demonstrated that creativity, independence, and initiative were found side by side with cooperation, socialization, friendliness, and lack of inner hostility.

The above studies seem to indicate some contradiction about the personality of the creative individual, but we may find an answer to this in the sampling technique. The riddle may be solved if we study the personal relationships of those creative individuals who seem to have fewer problems. In Watson's study (1960) we noted that creativity, socialization, independence, and friendliness co-existed. The variable of significance was the home atmosphere. He found that the more creative, friend-

and cooperative group came from permissive homes, but a lower scoring group had strict and domineering parents. Burkhardt found that the creative, liberal, non-authoritarian students came from mother-dominated homes, these 'homes' he considered more permissive. Weinberg's and Springer's (1961) findings were of a similar nature. They concluded that the stubborn independence which can be found in some creative individuals could be "facultative", being made necessary if creativity is to "survive an initially hostile or at least inert response".

A positive correlation between tolerance of ambiguity, a distinguishing characteristic of creativity, and love and acceptance of others was noted by Frankel-Brunswick (1950). Children who had greater tolerance for ambiguity came from homes of "non-ego destructive" types of discipline and with a more flexible atmosphere. Getzels and Jackson (1962) summarizes the home situation of the highly creative student as "one in which individual divergence is permitted and risks are accepted". They also claimed that the opposite is true of the high IQ family.

It could be concluded from the above mentioned studies that creativity has less chance to develop in authoritarian homes, where independence is discouraged through parental domination, child submission and dependency. In a healthy permissive home this is

quite different, individual growth is supported and self-discipline, independence and creativity furthered. Getzels and Jackson (1962) suggest that where freedom is accompanied by consistent pressure, the individual may still be creative, but hostility is engendered by such pressure and may retard other parts of his personality and talents, most of all in the area of interpersonal relationships. This is confirmed by research where high scorers on ego-strength showed hostility reactions toward others and also had more inner aggression. On the other hand, Barron (1963b), found that Ss with high ego-strength and less outer hostility experience less frustration and conflict in their interpersonal relations during childhood.

What can we conclude from the research concerning the creative individual? Most men seem to be role-playing animals. The role we expect the creative individual to play is often that of a withdrawn and isolated, or aggressive and defiant, rebel; whether he is or not usually depends on his environment, particularly his home-life during childhood. In order to be a creative adult he has to have at least some of the characteristics which MacKinnon (1962b, p. 38.) mentioned namely "his high level of effective intelligence, his openness to experience, his freedom from petty restraints and impoverishing inhibitions, his aesthetic sensitivity, his cognitive flexibility, his independence in thought and action, his high level of energy, his unquestioning commitment to creative endeavor, and his unceasing striving for creative solutions to the ever more difficult architectural problems which he constantly sets for himself". Simply to be creative, however may not necessarily be sufficient for an individual's happiness; he also needs to relate himself positively to other people, to the environment and to himself. We may assume that creativeness with isolation is less pleasant than creativeness with mutuality.

The typical personality features of the creative person have been presented in the discussion of MacKinnon's (see pages 4 to 14). The creative person possesses, other features, intelligence, "openness to experience", "freedom from petty restraints", "aesthetic sensitivity", "flexibility, non-conformity in thought and action and a "high level of energy". A number of other features which involve social relations and appear not to be fully discussed by MacKinnon are mentioned in this section of the creative individual. Other aspects relevant to the hypothesis have been discussed in other sections of this and the next.

3. Research in Creativity

Although geni in the various fields of Arts and Sciences have always been recognised and in many cases highly valued and respected, it was not until Galton's studies of men of genius (1869) that the eyes of natural science were turned upon them. But the real beginning in this field started with the name most automatically associated with creativity testing, namely J.P. Guilford.

The date was 1950, the place the American Psychological Association, and the subject of the topic of creativity which Guilford delivered for his presidential address. He pointed out that creativity has been neglected, out of a total of 121,000 references which had been indexed in the Psychological Abstracts over the last 23 years

only 186 references concerned themselves with the subject creativity. In his paper which Guilford subsequently published (1950) he mentioned that he was doing research in this field and that the application of factor analysis might increase our knowledge of the primary abilities that produce creative thinking. This speech started the ball rolling and the number of researchers who concentrated their attention on creativity increased tremendously.

A summary of research findings and views on creativity was published in 1967 by Mooney and Razik and later a more comprehensive one was edited and published by Vernon (1970). An analysis of research conducted in creativity between 1965 and 1968 was carried out by Schmidt (1969a).

More recent research has multiplied but few experimental hypotheses have been tested. Creativity consists of many discrete abilities which often do not correlate very much with each other. Also creativity has the highest correlations at the lower IQ levels. Research has concentrated on developing evaluative criteria for creative scientific production and on teaching.

The literature of creativity gives us six types of relevant studies :-

1. Research concerning differences between high and low creative persons, particularly in their cognitive functioning and personality structures;

2. Research in comparing individual creativity with that of group creativity;

3. Research in establishing relations between creativity, intelligence and academic achievement;

4. Studies in teaching creativity;

5. Studies in removing inhibitions and blocks to productive thinking;

6. Studies in the influence of the environment on creativity.

A summary of the literature on creativity, ranging from the earliest speculation to recent investigations, was published by Stein and Heinze (1960). A somewhat more up to date review of research results can be found in Taylor and Barron (1963) and in Taylor (1964a, 1964b). A good deal of work conducted in the field of creativity was also reported by Shapiro (1968). For this reason we shall not mention all the research in creativity and related fields, but only research relevant to this study.

Intelligence and Creativity:

Many psychologists and social scientists would argue that 'intelligence' is little more than a cover up term for our ignorance of the mechanics of thinking, there is still a very long way to go before we can throw off this cover.^x Of all the fields of research into creativity, research on the creativity-intelligence question is the most popular. Questions are asked about the intelligence-creativity

^x McNemar (1964) analyses this problem in his famous article "Lost: Our Intelligence? Why?"

correlation. If we consider the size and heterogeneity of the samples involved, intelligence-creativity correlations have ranged from .18 to .55 (Wade, 1968).

G. Taylor (1959) the energetic organizer of a number of research conferences on creative thinking at the University of Utah, found that creative adults are not necessarily superior to less creative workers in scholastic achievement as measured by intelligence tests.

On the other hand, Meer and Stein (1955) reported significant relationships between the scores of research chemists on the Wechsler-Bellevue, Miller Analogies, and supervisors ratings of creativity. If education and opportunity are held constant, I.Q. beyond the ninety-fifth percentile was not found to be significant for creative production.

Barron (1961) summarizing several studies, found a correlation of .40 between total range of creativity and intelligence. Beyond an I.Q. of about 120, measured intelligence is not related to creative ability.

Getzels and Jackson (1959) using the Stanford-Binet, Wechsler Scale for Children and the five creativity tests, Word Association, Uses for Things, Hidden Shapes, Fables, and Make-Up Problems selected two experimental groups of children. The first group consisted of children who scored the top 20% on creativity tests when compared with their peers, but below the top 20% in measured I.Q. The

other group was composed of children who scored in the top 20% in I.Q., but below the top 20% in creativity test scores. The highly creative child had a mean I.Q. of 127 and the High I.Q. but low creative child had an I.Q. of 150. The mean I.Q. of the population was 132. The achievement scores of the two experimental groups on standard subject-matter tests were equally superior to the achievement scores of the remainder of the school population. The correlation between I.Q. and creativity test scores was around 0.3; or in other words, had the pupils been selected by I.Q. alone, 70% of those with high creativity would have been missed.

The main criticism of Getzels' and Jackson's study is that his research concerned itself with only one atypical school.^x Torrance (1958, 1959a, 1959b, 1959c, 1959d, 1959e, 1960a, 1960b, 1960c, 1960d; Torrance, Baker & Bowers, 1959; Torrance & Radig, 1959) investigated creative thinking in the young child and brought together eight partial replications of Getzels' and Jackson's research. His two batteries of creativity tests consisted of a modification of Guilford tests with the exception of the Ask and Guess test which was developed by Torrance and Radig (1959). Torrance's (1960c) procedure was similar to Getzels' and Jackson's in that he selected groups who scored in the upper 20% on either the creativity or the I.Q. measures, but not in the upper 20% in the other measure. Most of his studies revealed no significant differences between scores attained on intelligence tests and those achieved on creativity tests.

^xThorndike (1963) mentions that the creativity tests used in Getzels' and Jackson's research did not correlate with each other to a much higher degree than they correlated with IQ and it is therefore possible to analyse their results further and to show that the creativity tests can be interpreted as partly assessing a factor of general intelligence.

Clarke and Olson (1965) investigating 15-year old boys who have shown outstanding achievement in athletics, science, leadership, and in the arts, found high intelligence the only quality out of 32 studied that characterized all these different groups.

Windholz (1968) data suggests that there is a relationship between creativity and intelligence measures; this is opposite to the findings by Getzels and Jackson as to the independence of creativity and intelligence. For Windholz the results obtained demonstrate that divergent and convergent tests within Guilford's model of the Structure of Intellect, are somewhat related.

Wallach and Kogan (1965) and other studies already mentioned indicate that highly intelligent, but rather non-creative subjects have a disinclination, rather than an inability, to use their imaginations. It appears that the individuals were reluctant or fearful of being original, rather than unable to be original. P.G. Bowers (1967) substantiated this through studies of creativity and hypnosis. Here, through hypnosis, it was investigated that many people have a potential for higher creative performance which is blocked from expression by defensiveness. Such experimentation supports the notion that individuals have ideas, but do not like to express them unless an environment is provided that gives them a mental set different from their habitual set. Explicitly or implicitly we have

to provide a psychologically secure and free environment.

The results of this research strongly support the idea that creativity and intelligence are independent modes of cognitive functioning. The investigators found that scores on creativity measures are highly intercorrelated, similar to various intelligence scores; but correlations between the creativity scores on the one hand and intelligence scores on the other, were proven to be extremely low. An explanation could be suggested for these discrepancies. There is the plausible 'threshold' suggestion about the relation between general intelligence and creative ability, which suggests that up to an I.Q. level of 120 general intelligence is the most important factor, particularly in predicting school achievement, but that at levels above this creativity begins to assume more importance (Barron 1963b; MacKinnon 1962a; Meer and Stein 1955).

Anxiety and Creativity:

The rationale for testing anxiety is primarily derived from the early work of Spence (1956) who suggested that anxiety is a drive, and that very strong drives or levels of anxiety can prevent adaptive changes in the behaviour of the individual. According to this statement a person with a high level of anxiety should score lower on tests requiring quick adaptive changes, and therefore on creative tasks, which require this kind of adaptability.

Feldhusen and others (1965b) correlated general anxiety with school and college achievement and creativity factors, and found that high-anxiety Ss were lower in achievement than low-anxiety Ss, but that differences in creativity scores were not significant.

Hadley (1965) investigated experimentally the relationship between creativity and anxiety in school children. His results demonstrate that not only is there a relationship between the amount of anxiety that a child feels about test-like situations and his score on a creativity test, but there is also strong evidence that no matter how anxious he may be, the introduction of an added anxiety-provoking situation curtails creative production.

Fleischer et al. (1965) studied the possible detrimental effect of anxiety upon creative-test performance and found that stress had no effect upon performance.

Feldhusen et al. (1965a) administered a battery of 5 divergent-thinking tests to high and low anxious children. Subsequently the children rated themselves and were rated by their teachers on a checklist of creative characteristics. This investigation found that the teachers' ratings were significantly lower than the differences between anxiety or sex-groups in performance on a battery of 5 divergent thinking tests. There were significant relations between both the anxiety level and the sex of the children, and the teachers' and children's rating on the checklist.

Zdep (1966) demonstrated that highly creative Ss are less anxious than Ss of lower creativity. Furthermore, I.Q. and creativity were positively correlated, while I.Q. and anxiety showed a negative relationship.

Allred (1967) concluded that creative potential, creative production and mental ability, are apparently related phenomena, and that situationally-induced anxiety apparently does not act as a drive to increase output.

Middents (1967), using Torrance's Tests of Creative Thinking and the MMPI found that there is a relationship between level of anxiety and creativity and between sex and creativity.

White's (1968) results indicate that persons with a relatively low level of anxiety perform significantly better on divergent thinking tasks than persons with a high level of anxiety.

Examination of this research makes it apparent that a test of the relationship between creativity and anxiety is still needed, and that attention should be paid to the factors of motivation, to which anxiety belongs.

Motivation and Creativity:

If we wish to classify theories of motivation we could note whether they are pluralistic or monistic in nature, and whether they postulate motivation as the avoidance of unwanted states or the approaching of wanted states. Murray's (1938) and McClelland's (1951) approaches can be viewed as pluralistic, because they speak of many motives, each of which has a specific aim that is clearly different from that of others. In opposition we find the monistic approach in the self-actualizing tendency of client-centred counsellors. The reduction of cognitive dissonance of Festinger's group, speaks of one or two possible motives which are so general that they could apply to both human and animal functions. Other theories of motivation involve survival needs (Hull, 1943), conceptualizing in terms of reduction through instrumental behaviour. Rogers (1959a) and Allport (1955) postulated what could be called approach theories which focus upon tension increase and the search for more stimulation.

Keeping the abovementioned theories in mind we come to the point where we must find a theory of motivation which seems most relevant to the explanation of creative production. In making a search through the literature we are not able to find a theory which will help us to bring motivation and

creativity closer to each other. The only theory which tries to bridge the gap between creativity and motivation is the one suggested by Maddi (1965). He chooses a pluralistic approach-type theory, adding that one or a particular set of distinguishing motives should be postulated which would be the same for all creative individuals. Maddi gives us two motives; the need for quality and the need for novelty. He suggests that these needs plus the appropriate talents will lead to creativity. He gives us experimental data which seem to support the novelty production part of the theory. He also sees persistence as one of the most salient factors in the lives of people who have consistently produced creative acts.

Maddi (1965) believes that if the need for quality is the dominant one, and the need for novelty weak, then a person would tend towards craftsmanship more than innovation. The opposite is true with the need of novelty. If both needs are of the same intensity, they would interact in such a way that the individual would try to combine craft and innovation. The motivational situation is necessary but not sufficient for creative production.

Minsterberg and Mussen (1953) tried to study motivation for creativity from a different angle. They attempted to study several hypotheses which were derived from psychoanalytic formulations of the creative personality. They believed that the data supports the following hypotheses:

- 1) more artists than other people have intense guilt feelings;
- 2) more artists than other people are introverts with a much richer inner life;
- 3) more artists than non-artists are unable or unwilling to get along with their parents.

They found no support for the following hypotheses:

- 1) Non-artists are more likely to show overt aggressive tendencies;
- 2) appreciation of the product supplies basic narcissistic gratification for the artist;
- 3) the artist interprets appreciation as evidence that others share his guilt. The hypothesis which was not derived from psychoanalytic formulation - that more artists than non-artists show a need for creative self-expression - was supported.

Myden (1959) chose 20 Ss from the "top rank" of the arts to form a highly creative group. The content and formal analysis of the Rorschach suggested that the creative group did use primary process significantly more often than the non-creative group. Myden assumes that the primary process is integrated with the secondary process in the highly creative group and does not come from anxiety. It was regression, not loss of ego control, that seemed to be part of the creative individual. He found no significant difference in anxiety between the two groups and the creative group used

significantly less regression than the non-creative group. Myden (1959) also found a significantly stronger sense of psychological role-in-life characteristics in the highly creative group. These people seem to be more "inner-directed and not easily swayed by outside reactions and opinions" (p. 156).

Golman (1961, 1962) viewed creativity as a hypothetical construct. Through this construct he attempted to demonstrate that creative products are only one segment of the creative behaviour which becomes manifest when individuals actively interact with their environment "so as to experience their fullest perceptual, cognitive, and expressive potentials". For him the highly "creative motive subject" prefers stimuli and situations which allow for idiosyncratic ways of dealing with them. He tried to prove his point experimentally, through the positive correlations between the WFPT and judged creativity in several fields in the arts and sciences.

Maslow's (1959) description of "self-actualizing" creativeness and Roger's (1962) conditions within the individual that are associated with a potentially creative act are very similar. For these researchers openness to experience is more important than premature conceptualization. The focus is more on the inner person than on the opinion of others. They suggest that the individual desires full achievement of his potentials through his interaction with

his environment. Fromm (1959), Murphy (1947, 1958), and Morney (1953a, 1953b) think about this subject on similar lines.

Golann (1963) in discussing motivational and personality dimensions in creativity, mentions two divergent viewpoints. One rises from the psychoanalytic School which treats creativity as a sublimation of repressed or unacceptable impulses. The other regards creativity as "an emergent property which matures as the individual attempts to realize his fullest potentials in his interaction with his environment" (Golann 1963, p. 554).

If we look closer into the study of the relationship between motivation and creativity we note that motivation, although necessary, is not the prime ingredient of creativity. Nearly all human behaviour is motivated, but only a very small portion of it can be called creative. However, we cannot ignore the fact that creativity too is motivated.

Field Independence-Dependence and Creativity:

Experimental psychologists have demonstrated an increasing interest in the study of 'cognitive styles'. One of the most systematically studied dimensions in this area of personality research has been done by Witkin and his associates (Witkin, et al., 1954, 1962) in their investigations with field-dependent and field-independent cognitive styles. Witkin's interest in this personality dimension started during the late 1940's with a study (1950) of how a person

orientates himself in space. Witkin observed strikingly consistent patterns of individual performances which led to more than twenty years of experimental investigations on the personality-perception relationship, and demonstrated that the person's perceptual performance is related consistently to highly diverse areas of cognitive life.

Witkin's investigation has been based almost exclusively upon three perceptual tasks: the 'Body-Adjustment Test' (BAT), the 'Rod-and Frame Test' (RFT), and the 'Embedded-Figure Test' (EFT). Each of these experimental situations requires that the individual keep an item (his body, a luminous rod, a geometric design) separated from the context of which it is a part. That means that the individual has to deal "analytically" with a field or a configuration. If the person was able to deal with the "field" in an analytic fashion, to differentiate objects from embedding background, then he was labelled field-independent by Witkin. If the individual, on the other hand, could not keep an item separate from its context, that is the dominant organization of the field, he was designated as field-dependent.

Witkin's (1962) first studies demonstrated that the perceptual functioning of field-independence and field-dependence in human beings is related in a meaningful and coherent fashion to general and highly diverse aspects of cognitive functioning which include the emotional, intellectual, social, motivational, and even the defensive life

of the person. Until the present time there has surprisingly been almost no research done relating these modes of orientation to creativity (Bloomberg, 1967; Wallach & Kogan, 1965; MacKinnon, 1962a & b; Crutchfield, et al., 1958).

Witkin (1954) discusses briefly the relationships between field-dependence/field-independence and creativity, but does not formulate any specific hypotheses about these relationships. Needless to say he notes that Wertheimer (1945) mentions a conceptual model which provides possible linkage between these two modes of thinking and creative thinking. Wertheimer indicated that the ability to "break up" and reorganize configurations in problem-solving tasks could be evidenced in situations calling for creative expression since "... problems that call for a high degree of creativity ... also require that the 'parts' be separated from the contexts in which they are embedded, and brought into new relationships" (p. 477).

As already mentioned the possibility of an experimental interaction between field-independence and creative thinking has been almost completely neglected. It is well-known that the creative individual sees and interacts with the world differently from his non-creative counterpart, but a systematic examination of this different perceptual mode has not been experimentally tested. Among studies which try to look into this problem systematically, the most direct results come from Spotts and Mackler (1967)

who report that field-independent persons were consistently more creative than field-dependent persons. Others (Bieri, Bradburn, and Galinsky, 1958; Getzels and Jackson, 1962; and Rouse, 1963) investigated this problem with results that were rather inconclusive. Bieri et al. (1958) and Rouse (1963) could find only very weak tendencies in the relationship between creativity and field-independence. Bloomberg (1967) believes that the failure to obtain more clear-cut findings was due to the choice of measures. These four investigations exhaust the body of direct evidence. These fragmentary studies indicate that field-independence is a necessary condition for creativity, and other empirical clues (Witkin, 1962) of an indirect nature support this assumption.

It appears from this research that field-independent persons have several personality factors which can also be found in creative persons. This does not mean that all field-independent persons are also creative. There are also factors of field-independence which hinder creative production. Crutchfield (1961) assumes that "analytical perception is sometimes the enemy of creative insight. What may be needed is a free spontaneous look at the phenomenon, a childlike apprehension of what is there, an attitude of what may be called disciplined naiveté". Creative production does not only involve the task of dissecting the data and attempting to unravel its meaning, but it also involves the individual in the task of relaxing and letting the

whole problem proceed in the direction it wants to. After a while the problem will receive its own momentum and will carry the individual to a solution, but it can also lead him astray.

There are a number of divergent theories which try to show the nature of creativity and how it is related to field-dependent and field-independent cognitive styles. Most theories believe that the creative individual is interrelated with his environment and that he has a sensuous or even "jarring" personal encounter between other people and other objects. Some psychologists, like Adler (Ansbacher & Ansbacher, 1956), Fromm (1959), Schachtel (1959), May (1959), Mackler & Shontz (1965) and Wertheimer (1945), stress that the creative person is highly sensitive to his environment. He is open and sensitive to the activities of his world, and shows a need and capacity to manipulate, reorganize, restructure and integrate divergent and even contradictory elements of his experience.

The experimental evidence portrays the field-dependent individual as a person who is very responsive to his environment. He has only a limited awareness of his own impulses and has difficulty in structuring his life and experience into a meaningfully organized pattern or part-whole relationship. His anxieties are easily increased and he needs strong external support and reassurance. His difficulty in handling new and unusual situations limits his ability to be part of a creative experience. We note, that the field-dependent person is not only highly sensitive to his

environment, but that he is also "victimized" by it. He is unable to organize and integrate both inner and outer experiences.

The field-independent person is seen as an individual who demonstrates greater and more articulated awareness of his inner experiences and the interaction of environmental events. He may lack the "sybiotic openness" of his counterpart, but he has an unusual capacity to "break up" concepts and experiences and to remould and reconstitute them in new variations and configurations. Besides this, the field-independent individual shows the kind of autonomy and freedom from societal customs and restraints which could be seen as a necessity for a creative encounter.

Visualization and Creativity:

The attempts to explain and understand the creative process have not been completely successful. The reason for this could be that perhaps one ingredient about the creative process has been neglected and that the answer might lie in this ingredient. It is assumed that the creative person has inherited or developed to a high degree of perfection the ability to visualize in the field in which he is creative. The creative individual must involve himself in the details of the problem for defining, classifying and clarifying, but still holds a detached view of the whole problem at times for capturing attributes of the entire phenomenon that cannot

be dissected and for bringing back into focus elements which have formerly been neglected or eliminated. We have here a blending together of two functions, involvement and detachment. Visualization, which involves these functions, might explain why some individuals are more creative than others.

The subject of visualization during the process of creativity has, with the exception of Walkup (1965), been completely ignored in the English speaking world. Van Lennep (1962, 1966a, and 1966b), a Dutchman, summarizes the European concern with visualization and gives us his model of creativity.

Van Lennep (1966a) states that the theoretical background to visualization can be found in the French literature on intelligence, invention and creativity as far back as 300 years. The French authors always looked upon visualization as a higher form of intelligence and they called it "étendue de l'esprit". Van Lennep mentions that Pascal and La Rochefoucauld (born 1613) considered it the extension (l'étendue) of the enlightenment which produces all the effects of judgement. Vauvenargues writes 100 years later a beautiful passage which I quote in translation.

"Of broad compass of the mind."

An all-embracing mind considers the phenomena in their mutual relationships; it grasps at a glance all the branches of things; it brings them back together in their source and into a common centre; it subjects them to one and the same point of view. Finally, it sheds light on large objects and over a vast area. One could not have a great genius without having an all-embracing mind, but it is possible for one to have

an all-embracing mind without having genius; for these are two distinct things. Genius is active, fecund; the all-embracing mind very often confines itself to speculation; it is cold, lazy and timid. Everyone knows that this quality depends just as much on the "heart", which normally gives to the mind its own limits, and either shrinks it or expands it, according to the scope which it gives itself. There have always been men who know a great deal but had very mediocre minds, and conversely, men with very vast minds but who knew very little." (Van Lennep, 1966a, p.5).

With an all-embracing mind, Vauvenargues, speaks about what Van Lennep and the author call visualization and Van Lennep brings it into contact with creativity. The all-embracing or visualizing mind can only be productive if it is supported by sufficient mental energy and is co-determined by an affective personality (by the "heart").

Another Frenchman, Burloud (1948) speaks about the all-embracing or visualizing mind through the following quotation:

"Intelligence, we have said, is characterized now by the power to embrace vast complexes at a single glance of the mind, now by the degree of abstraction. Genius in our view is merely the highest degree of intelligence, which it exceeds, either by breadth of its vision, or by its capacity to discover the profoundest and most hidden relationships between things, which make possible the most original synthesis. Indeed, if one considers works of genius themselves, one sees that they possess common characteristics which are the very characteristics of intelligence: order, unity in variety, breadth of vision or depth of abstraction. It is here that the creation of the artist are most akin to the conceptions of a man of learning or a great statesman." (Van Lennep, 1966a, p.6).

Visualization, or whatever name one might give to it means that as soon as an individual is committed to solve a problem or to create or invent a new or novel product, an idea or system of ideas emerges in his mind which will guide him towards a solution. This process holds within it anticipating properties. Goethe (1823) calls this process "schöpferische Vorerkenntnis" (creative pre-knowledge). We could also call it "a synthetic anticipation of conceptual relations" (Van Lennep, 1966a).

Van Lennep (1966a) believes that the greater the visualizing capacity of an individual, the more chances he has of hitting on an anticipating idea that will lead him to a positive solution. While studying the grading system of art instructors at the Academy of Fine Arts in the Netherlands, Van Lennep (1966a) noted that the unsatisfactory products were those which, instead of showing a principle pervading throughout all the details, appeared to be a mere collection of details, perhaps original in themselves, but not impregnated by a transcending idea through which the part becomes a whole. The superiorly rated products revealed a personal vision permeating every detail and transcending them, "as originating from a bird's-eye view". The products were considered the most original ones even if the themes were conventional.

Van Lennep's (1966b) model of creative visualization is an "overall view of a large number of unconnected data which often puts a scientific (or non-scientific) thinker

in a position to connect by a sudden flash of inspiration those data which will provide the solution to a problem". Van Lennep claims that this model is not only favourable to further creative solutions, but is equally applicable to the subjects internal milieu as to the social setting in which the creative individual lives.

Van Lennep (1962) suggests that creativity should be distinguished from what we normally call intelligence and that the ability to visualize refers mostly to the ability to solve more or less abstract problems, theoretical or practical, without being oneself necessarily involved in the situation. The creative person has to regard himself in a degree of detachment even though at the moment he is personally, and thus also emotionally involved. What is important in visualization is not identification, but its opposite, detachment, and through this detachment we gain an overall picture of the situation in which we ourselves are participating. The creative individual has to have the detachment to visualize everything in its proper perspective, especially ourselves and the role we play in a whole set of given circumstances on which decisions have to be based, so that creative production can occur.

Walkup (1965) gives us evidence that the process of visualization applies to much more complex fields. A number of inventors were visualizing extremely complex situations when their revealing flash came to them. The famous visualization by Kekule led him to discover the benzene ring,

through a vision of a series of linking atoms biting its tail like a snake. A similar vision solved Michael Faraday's problem. Albert Einstein thought out and solved his problems not in a language of words but of mechanical and symbolic images. The famous mathematician Jacques Hadamard claimed that he thought exclusively in visual pictures. These individuals did not realize the uniqueness of visualization and assumed that all people had the capability to manipulate images.

Openness to Experience and Creativity:

The concept of the famous German philosopher Max Scheler (1928) that modern man as a spiritual and creative being is no longer subject to the primitive drives but is "open to the world" could have influenced Schachtel. Openness to the world is an important human attitude, as important as courage is for the lion tamer. But openness to the world is not all that is needed for creative production, just as courage alone does not make a good teacher or strategist. One of the focal points of Schachtel's (1959) thought was that the "main motivation at the root of creative experience is man's need to relate to the world around him..." Creativity is not able to function if man is not open to experience.

Openness to experience was also important for Barron (1963 a + b). He mentions a number of studies which support his view that preference for complex line drawings

is associated with independence of thought, openness to experience and other variables related to creativity. The noncreative person prefers simpler line drawings.

Kellmer Pringle and McKenzie (1965) studied the relationship between problem solving and rigidity in two schools. They found no differences between the schools in rigidity, but found a relationship between rigidity and intelligence; pupils of more limited intelligence showed a significantly higher degree of rigidity.

Merryman (1967) set out to determine whether a significant relationship existed between open-closed-mindedness, singly and in combination with other selected variables, and between creativity and the component measures of creativity. It was concluded that a significant relationship did exist between open-closed-mindedness and the criteria of originality, elaboration, and creativity; and that open-closed-mindedness, singly and in combination with selected variables could reduce the error in prediction for the following criterion variables: fluency, originality, elaboration and creativity.

Cohen (1960) found that creative people will be more open to experience than uncreative people. He used art students who were judged by their teacher according to their observed creativity. It is very tempting, in view of the elusiveness of the creative process, to conclude from this finding, as well as from other data already cited

that openness to experience (open-mindedness, flexibility and tolerance) is positively related to creativity.

It is clear, however, that creative production involves something more than openness to experience. An open belief system, however open, is not necessarily a belief system which will generate novel and worthwhile products. Representing as it does a discriminating and receptive state of mind, it is in an excellent position to recognize the creative productions of other people as creative, but is not necessarily creative itself. We are speaking here only about one condition which is part of the creative process.

The creative person has certain beliefs, some psychologists and social scientists tend to call them values, in what is important, which involves criteria different in degree or kind from beliefs about importance entertained by less creative persons. These beliefs about importance guide the formulation of questions and enable the creative individual to discriminate between relatively important and relatively trivial questions, something the less creative individual cannot accomplish.

Academic Achievement and Creativity:

Many studies have been undertaken in an attempt to explore the relationship between creativity and different kinds of achievement. The term "academic achievement" includes so much that it is difficult to describe it adequately. It is quite clear that it involves many different

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