

CREATIVITY: DEFINITIONS, EXPLANATIONS AND FACILITATION

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Definitions of creativity in terms of product, process and subjective experience are considered. Major attempts to provide theoretical explanations of creativity are then reviewed. Finally, views on the critical period hypothesis concerning the facilitation of creativity are outlined.

This paper reviews the major attempts to build a theory of creativity. The greater part of this work began less than two decades ago. In his 1950 presidential address to the American Psychological Association, J. P. Guilford commented that the neglect of the subject of creativity by psychologists and educators was 'appalling' (15). In his search of *Psychological Abstracts* for the previous twenty-three years, Guilford could find only 186 related titles, none of which was of great theoretical importance. In the eighteen years since then, the situation has changed dramatically. For example, Razik (42) lists 4,176 titles in his bibliography on this subject. Because of the volume of the work during the last ten years, this review of theoretical issues will obviously be highly selective. The works selected are discussed under the following three headings: the definitions of creativity, theoretical explanations of creativity, and the critical period hypothesis as to the facilitation of creativity.

DEFINITIONS OF CREATIVITY

Any attempt to present a consensus definition of the construct of creativity is doomed to failure, the definitions of creativity being only slightly fewer than the numerous works on the subject. As long ago as 1960, Repucci (43) had listed twenty-six different definitions for this construct, and a considerable number of variations have been offered since then. However, Getzels and Madaus (12) pointed out that most attempts at definition 'may be classified into three categories, depending on the relative emphasis given the product, the process, or the experience'.

A large number of definitions centre on the meaning of a 'creative' product. Thus Flanagan (9), for example, claims that the creative product ought to be a clever rather than merely satisfactory solution to a problem. Further, he asserts that the creative product is distinguished by the

inability of logical, routine or mechanical processes to produce it. Following similar lines, Jackson and Messick (24) point out that the creative product must meet four criteria: unusualness, appropriateness, transformation and condensation. The first criterion, unusualness, appears frequently in definitions of creative products. Mednick (35, 36), Torrance (49, 50, 51, 52, 53, 54), Guilford (15, 16, 17, 19) and others, for example, operationalize this criterion by a measure of statistical infrequency. The criterion of appropriateness is used to eliminate products that, while admittedly unusual, are simply absurd. The third criterion, transformation, asks whether or not the product overcomes conventional constraints rather than being merely new. Bruner (4) talks of transformation in terms of 'effective surprise'. Here Bruner is not talking of the unusual, infrequent product but rather of products that have the 'quality of obviousness about them when they occur, producing a shock of recognition following which there is no longer astonishment' (4, p. 18). Bruner's 'effective surprise' is also related to condensation, the final criterion of Jackson and Messick. Here the product is typified by simplification of complexity, that is, the product contains great summary power such as a mathematical formula or a poem.

Another widely used set of criteria for determining whether a product is creative or not are those used by the United States for patenting inventions. McPherson (34) summarizes these criteria of 'inventive level' as follows: (i) qualified intellectual activity must have preceded the invention or creation, (ii) the product must be useful and provide a stride forward, (iii) it must overcome special difficulties, (iv) the amount of experimentation carried on before achievement of the novelty is considered relevant, (v) the existence of a history of failure prior to the invention is also considered relevant, (vi) a product is considered particularly creative if persons engaged in the branch of activity involved has shown prior skepticism about the likelihood of the innovator's line of inquiry, (vii) the product should fulfil a previously unfulfilled desire.

The second category of definitions of creativity emphasizes the underlying process rather than any overt product. Mednick and Mednick's (36) definition of creativity is an excellent example of emphasis on process: 'Creative thinking consists of forming new combinations of associative elements which combinations either meet specified requirements, or are in some way useful'. However, similar to the patent law criteria, they also add that 'the more mutually remote the elements of the new combination, the more creative is the process or solution' (36, p. 55).

Barron (3) puts less emphasis on the observable manifestations of the

creative process than the Mednicks. He argues that the process can be just as easily conceived of 'as an internal process continually in action but not always observable'. Along similar lines, Ghiselin (13) and Moustakas (37) both give non-operational definitions of the creative process emphasizing the actualizing of one's identity or psychic life in the solving of particular problems.

The third category of definitions, those that emphasize the subjective experience of creativity, is typified by the writings of Maslow (32), who describes eighteen experiences associated with the creative act. Among these experiences are a loss of self-consciousness, a transcendence of self, seeing formerly hidden truths, exaltation, fullest spontaneity, recovery of the unconscious and preconscious, and aesthetic perception.

A major aspect of experiential definitions of creativity has to do with the optimal integration of the physiological, emotional and intellectual systems of the human body. Rollo May (33), for example, believes that 'any penetrating explanation of the creative process must take it as the expression of the normal man in the act of actualizing himself not as the product of sickness, but as the representation of the highest degree of emotional health'. However, as Barron (2) points out, especially healthy persons with high levels of personality integration need a temporary upset and agitation as the prerequisite for the creative experience.

Newell, Shaw and Simon (38) include the product, process and experience in the following omnibus definition of creative thinking: (i) the product of the thinking should have novelty and value (either for the thinker or for his culture), (ii) the thinking should be unconventional, in the sense that it requires modification or rejection of previously accepted ideas, (iii) the thinking should also require high motivation and persistence, taking place either over a considerable span of time (continuously or intermittently) or at high intensity, (iv) part of the task is the formulation of the problem itself (initially vague and ill-defined).

Another excellent summary definition of creativity is supplied by Drevdahl who describes it as

the capacity of persons to produce compositions, products, or ideas of any sort which are essentially new or novel, and previously unknown to the producer. It can be imaginative activity, or thought synthesis, where the product is not a mere summation. It may involve the forming of new patterns and combinations of information derived from past experience, and the transplanting of old relationships to new correlates. It must be purposeful or goal directed, not mere idle

fantasy—although it need not have immediate practical application or be a perfect and complete product. It may take the form of an artistic, literary or scientific production or may be of a procedural or methodological nature (8, p. 22)

However, even such summary definitions, no matter what their focus or inclusiveness, are not completely satisfactory to all, the complexity of creativity more or less militates against a universally acceptable definition.

THEORETICAL EXPLANATIONS OF CREATIVITY

Attempts to define creativity, whether they emphasize the product, the process or the experience, are descriptive rather than explanatory in nature. Theory goes beyond description and attempts to explain the creative act, process or experience (although admittedly explanation is often inseparable from description). Attempts at explanation, like attempts at definition, are varied and diverse. Theories of creativity are based on such widely divergent viewpoints as biology, associationism, traditional logic, factor analysis, S-R connectionism, psychoanalysis, cognitive psychology, and computer simulation of intellectual operations.

In their seminal work, Getzels and Jackson (11) have outlined five of the best-known theories on the creative process. Chronologically, the first coherent theory of creativity derives from traditional logic. Creativity is considered to be thinking at a highly accurate level, largely a matter of the development of inductive and deductive reasoning skills, syllogistic reasoning, the ability to form general concepts, to abstract, and to draw conclusions.

The second theory is that of associationism, in which all thinking is conceived of as a chain of ideas, linked together through habit, strong stimulation, combinatory play, or associative play. New ideas were thought to be produced by the trial and error associations of old ideas in which numerous pairings were made randomly until a pairing occurred which remedied the problem, generated a new use, or the like.

Mednick (35) has suggested a new associative theory of creativity. According to this theory, the creative act is the forming of associative elements into new combinations which are useful in some specific way. There are three ways of reaching creative solutions: serendipity, similarity, and mediation. Serendipity is the achievement of creative thought through the accidental contiguity of stimuli. Trial-and-error matching of a problem with its possible solutions is an example. Similarity refers to creation

through the pairing of like elements in the environment, as in the case of rhyming and alliteration in poetry. In mediation, the elements of the solution are brought into contiguity through the mediation of common elements. As an example, Mednick suggests that the idea of relating reactive inhibition and cortical saturation may have been mediated by the common associate, tiredness. Persons with 'flat associative hierarchies,' i.e., those who have relatively few well-established, strongly dominant associations, are more likely to be able to form new associations by any of the three methods mentioned above.

Similar in several ways to Mednick's explanation but more refined, is Koestler's matrix theory. Koestler (25) uses Archimedes' discovery of the law of displacement as an example of his theory. Archimedes was set the task of determining whether a king's crown was made of pure gold. He knew the weight of gold per unit of volume, but he did not know the volume of the crown. Koestler refers to the set of laws governing weight and volume as a matrix. As long as Archimedes attempted to solve his problem within the weight-volume matrix, he was doomed to failure, since the set of laws do not include a means of measuring irregular shapes. Koestler describes the event which finally led to the creative solution.

One day, while getting into his bath, Archimedes watched absent-mindedly the familiar sight of the water-level rising from one smudge on the basin to the next as a result of the immersion of his body, and it occurred to him in a flash that the volume of water displaced was equal to the volume of the immersed parts of his own body—which therefore could simply be measured by the pint. He had melted his own body down, as it were, without harming it, and he could do the same with the crown (25, p. 105).

Koestler argues that only when Archimedes made the link between the weight-volume matrix and the displacement matrix was he able to reach a creative solution. For Koestler, this linkage between diverse matrices is the basis of all creative solutions. The connection almost always occurs as a flash of insight and is typically the result of unconscious thought processes.

Mednick (35) and Wallach and Kogan (55) are attempting to empirically verify an associationist explanation of creativity. Further, the most widely used measures of creativity, the divergent thinking tests of Guilford (21) and Torrance (54), are based on associative theory. These measures ask the individual to generate ways in which an object can be used, or ways

in which different objects are similar or share the same attribute. Creativity is operationally defined as the number of associations the person makes and the relative uniqueness of these associations.

Guilford's (16, 19, 21) model of the intellect, arrived at through factor analytic techniques, equates creative thought primarily with divergent productions. These productions can differ according to type of content (Guilford categorizes these as figural, symbolic and semantic) and according to product (categorized as units, classes, relations, systems, transformations and implications). This view of creativity, based on empirical research, in many ways closely resembles aspects of associationist theory. The model, which is more descriptive than explanatory, defines creativity as thinking that goes off in a different direction, characterized by changes of direction in problem-solving leading to a diversity of answers. Guilford has related creativity to six cognitive factors: sensitivity to problems, redefinition abilities, fluency, flexibility, originality and elaboration.

Among other things, Guilford's (20) recent work has been concerned with isolating and demonstrating the factors of divergent production at lower age levels. He has now identified these factors in all content areas and in all product types, with the exception of figural relations and symbolic transformations, which have yet to be investigated. He has demonstrated all of the semantic factors at sixth and ninth grade and adult levels. All other factors (but for the two mentioned above) have been identified at the ninth grade or adult levels, or both.

These first two theories of creativity, logical and associationist, were challenged by Gestalt psychologists. Wertheimer, for example, did not see creativity as associations of individual pieces of information. He wrote, 'there is *grouping, reorganization, structurization*, operations of dividing into sub-wholes and still seeing these sub-wholes together, with clear reference to the whole figure and each step is taken surveying the whole situation' (57, pp 41-42). The whole may consist of an 'S₁', a perceived problem, or of an 'S₂', a partially conceived solution from which the creator works backward. An example of the latter is the musician, who does not write notes on a page in hope of composing something, but rather gets a half formed idea of the finished whole and works backwards to finish the whole.

A fourth explanation of the creative process is the psychoanalytic conception of Freud, in which conflict plays an important part in the genesis of creativity. It is believed that this is the same kind of conflict which motivates neurotic behaviour in others, the difference being that the creative person resolves his conflicts fruitfully. As Barron (3) points

out, this view of creativity places little emphasis on syllogistic reasoning, inductive and deductive thinking, or correct associations, but instead emphasizes symbols, dreams, play, lightheartedness

Schachtel (46) has suggested a perceptual explanation of creativity. He hypothesizes two basic modes of perception, the autocentric and the allocentric. The autocentric mode is subject-centred and occurs in childhood. The child views his world with little or no objectivity, thinking of objects only in terms of their effects on his pleasure. Perception normally occurs only when an object impinges on the status quo of the child. The allocentric mode emphasizes what the object itself is really like, without regard to its effect on the perceiver. The person is the manipulator of objects, rather than being manipulated by them as in the autocentric mode. Development moves towards the allocentric mode. However, in doing so, a secondary autocentricity develops.

In this stage, objects are perceived in terms of how they may be used to serve the perceiver or avoided if they are likely to promote pain. Also, as in the primary stage of autocentricity, the perceiver views objects in terms of their newness and strangeness, and, as a result, as possible threats to his equanimity. Thus he seeks to avoid them. Schachtel believes that the creative process involves *resisting* this latter stage as much as possible, so as to be able to remain perceptually open to the world.

Weisberg and Springer (56) offer an environmental explanation of creativity. The creative child is a product of a home which fosters expressiveness without domination, acceptance of regression, and a lack of dependency of family members on each other as a means of reinforcing their own individuality.

Similarly, Hudson (23) theorizes that the differences in intellectual function between 'convergers' and 'divergers' are essentially forged through early experiences in the home. Thus the 'converger' is a product of a parental background where expressions of love and approval are given primarily on the occasions of mastery of impersonal, practical skills. On the other hand, such skills are depreciated by the 'diverger's' parents, who express love and approval on a far more personal basis.

At the opposite extreme from environmental explanation is the explanation of Gutmann (22) who uses a biological framework to establish a link between the creative activities of man and the creative processes inherent in life. For Gutman, creative ability resembles the self-duplicating activity of the DNA molecule or the gene, it is a 're-enactment of the biological process of self-duplication on the behavioral level' (22, p. 10).

Newell, Shaw and Simon (38) offer a computer simulation model to

explain creativity. In their admittedly mechanistic approach, they claim a satisfactory theory of creativity when they can design and build 'some mechanisms that could think creatively (exhibit behaviour just like that of a human carrying on creative activity)', and when they can state 'the general principles on which the mechanisms were built and operated' (38, p 64). Using these two criteria, they have been partially successful in that they have several computer programmes to *simulate* creative behaviour, some of which have been run, some coded but not run, and some still on the flowchart.

THE CRITICAL PERIOD HYPOTHESIS AND THE FACILITATION OF CREATIVITY

In the field of creativity theory, there are two polar positions as to the existence of a critical period in life, after which it becomes useless to attempt to facilitate creative abilities. The position of those who support a critical period hypothesis is reviewed first. Coincidentally or not, this group of 'as the twig is bent so the tree will grow' theorists can also be categorized as neo-Freudians.

The 'guilt-will conflict' theory of Otto Rank (41) is an excellent example of the position of those theorists who feel the creative potential of an individual is more or less fixed or permanent. Rank sees the early conflict which the child experiences as a determining factor in his total development. At birth, the child has no will of his own. Only as he interacts with his environment does he develop personal desires. Rank regards the development of the will as 'a positive guiding organization and integration of the self which utilizes creatively, as well as inhibits and controls, the instinctive drives' (41, p 112). But with increasing frequency the child's desires run counter to those of his parents. Parental resistance to the child's developing will nurtures guilt feelings in the child, and he experiences internal conflict. The resolution of this conflict depends largely on the strength of the parental resistance to the child's will.

Rank suggests three types of resolution of the conflict. In the large majority of cases, parental domination is so strong that the child finds it easier to learn to adapt his will to theirs. This type of solution is likely to come *before the child goes to school*, and Rank considers it virtually irreversible. If the child does not become fixated at this stage, however (the parents' resistance being less than in the first case), he remains permanently conflicted and feels a separateness from society which prevents his becoming a conformist, but at the same time prohibits creativity. Finally, if the child's parents recognize and respect his right

to a will of his own in this early development stage, the child is allowed to resolve the conflict in favour of his will. He then has creative potential which can be fostered by subsequent experience.

A position quite similar to Rank's is held by the environmental theorists, Weisberg and Springer (56). On the basis of their in-depth case studies of children, they conclude that parental influences are critical to the development of creativity. They hypothesized that only the child from an 'adaptive,' 'non-anxiety producing' early environment has any likelihood of becoming a creative adult. In other words, a child not so favoured would benefit little from a facilitation programme at a later stage.

A test of Rank's theory with creative adults has been carried out by MacKinnon (28) in a post hoc analysis of the data accumulated in his earlier study of creative architects (27). He examined the architects' responses to the Gough Adjective Check List and found that the adjectives typically chosen by each of his three groups (called least, intermediate and most creative) correspond well with Rank's three personality types (adapted, conflicted and creative).

Another neo-Freudian position is that of Deutsch (7), who believes that creativity is an unconscious defence against the commission of a neurotic act. Fantasies which occur in the preliminary stages of mental illness are thought to be very similar to the fantasies of the creative person, the basic difference being that the neurotic merely imagines that the changes he so desperately desires have occurred, whereas the creative individual actually brings about the desired change. Because this process occurs in the unconscious (to a large extent, the product of early childhood experiences), the process is considered extremely resistant to conscious manipulation. Thus school programmes to develop or facilitate creativity, according to this theoretical position, would be of little avail.

A third (and even more deterministic) position in support of the critical period hypothesis is Alfred Adler's compensatory theory of creativity. Adler hypothesized that creativity is generally the result of overcoming a severe personal difficulty in childhood. The difficulty typically lies either in a neurotic character or an organic disorder.

Often (gemuses) started with gravely imperfect organs. In almost all outstanding people, we find some organ imperfection. We gather the impression that they were sorely confronted at the beginning of life but struggled and overcame their difficulties. We can notice how early they fixed their interests and how hard they trained themselves in their childhood. They sharpened their senses, so that they could

make contact with the problems of the world and understand them (1, p 213)

Clearly, therefore, if no serious personal difficulty is faced and overcome during childhood, most individuals are not very likely to be outstandingly creative in later life. If this extreme position is accepted, again school programmes to develop creativity will probably be of little avail.

Holding a view contrary to the proponents of the critical period hypothesis is a group of theorists who, though of diverse psychological orientation, nevertheless agree that an individual's creative potential can be actualized at any age. Rogers (45), for example, has proposed the conditions of 'psychological safety and freedom,' which he believes will facilitate the creativity of *all* students. 'Psychological safety' refers to the situation in which the student can be made to feel of substantial worth in his own right, is assured that external evaluation is absent, and is confident that people empathize with his problems. The teacher, in providing 'psychological safety,' makes possible 'psychological freedom.' This is the freedom of the individual to *symbolically* express otherwise socially unacceptable behaviour. If 'psychological safety and freedom' are provided for one group and not for another, Rogers predicts that the former group will produce a greater number of creative products.

Related to Rogers' concepts of safety and freedom is the 'self-actualization' theory of Maslow, who 'tends to see more or less creativity in every person, if only as a suppressed potential, and asks the questions, "Why was it lost?" "How much is left?" "How much can be recovered?"' (32, p 94). Suppressed creative potential can be released, he argues, through a clearer understanding of the self. Creative persons are comparatively unfrightened by the unknown and often are attracted by it. This unknown element includes the self. Self-actualizing persons typically seek to know themselves, accept what they find, and are adept at integrating this new knowledge with their prevalent self-concept. Maslow claims most people have had this type of experience and, more important from the point of view of this discovery, can be taught to become proficient at it.

This emphasis on freedom is central to Kubie's (26) argument that the typical situation in American classrooms has been so stultifying that students are not merely conformists, but actually semi-neurotic, and that educators do not recognize the situation because they tend to regard the typical as the normal. Viewing creativity as a 'preconscious' activity (i.e., as operating between the conscious and unconscious processes), he feels that teachers need to provide freedom for students to engage in precon-

scious activity This is done by assisting students to acquire divergent thinking skills and attitudes, which in turn free the student from his masked neuroses and lead to creativity

Eric Fromm (10) contends that crucial attitudinal characteristics are susceptible to environmental manipulation He bases this on his belief that creativity 'does not refer to a quality which particularly gifted persons or artists could achieve, but to an attitude which every human being should and can achieve' (10, p 54) The five attitudinal characteristics which are most susceptible to manipulation for creative development are the capacity to be puzzled or surprised, the ability to concentrate, an objective knowledge of self, the ability to accept conflict and tension resulting from polarity, and the willingness to let go of securities such as parental support

The previous four theorists are clinical in their orientation Several experimentally oriented theorists have also disputed the critical period hypothesis Maltzman and his associates (29, 30, 31), for instance, in their studies of facilitation of originality, a major factor in creativity, have employed S-R associationist theory They argue that a person can be trained to produce original responses to a given stimulus, responses that had previously been low on the person's response hierarchy

Following the precepts of Pavlovian learning theory, Russian psychologists advocate educational procedures in contrast to all psychoanalytic or 'self' theories They attempt to condition creativity by selecting some strong point in the individual and strengthening it through the use of rewarding experiences This is facilitated by the high degree of control possible within the collective educational system Is such a highly planned system likely to promote the creative abilities of its students? Sanford (47) summarizes the Russian position 'Although it is desirable, as well as possible, for the individual's habit system to become autonomous in the sense that it can function independently of the immediately present social group—it is wise to have the right habits continually reinforced by example and group pressure' (47, p 171) It appears to us that while the Russian system attempts to encourage aesthetic and scientific creativity, it tends to suppress social and ideological creativity by promoting conformity to group ideals

A representative of the psychometric point of view, J P Guilford, has summarized his position on facilitation as follows

Education in this country has unfortunately been too much dominated by the learning theory based on the stimulus-response model of

Thorndike, Hull and Skinner People, after all, are not rats (with a few exceptions) and they are not pigeons (with similar exceptions) Let us make full use of the human brains that have been granted us Let us apply a psychology that recognizes the full range of human intellectual qualities We must make more complete use of our most precious natural resource—the intellectual abilities of our people, including their creative potentialities (18)

Probably the most adamant advocate of education for creativity is E Paul Torrance, whose many studies and reviews of research on the subject (49, 50, 52, 53, 54) have convinced him that many useful instructional techniques exist He categorically states that 'we now know that children can be taught in ways that bring their creative thinking abilities into use in acquiring even the traditional educational skills' (50, p 16)

The position of this second group of theorists, therefore, is that creativity does not become fixed in early childhood, but is rather a characteristic which can and does change in later life It is argued accordingly that if instruction is effectively designed, it is likely that *all* students will benefit from it, commensurate with their existing levels of performance

FUTURE DIRECTIONS

In recent years, educational psychology in the United States has been moving away from concern with theories of learning and towards greater concern with theories of instruction The latter are attempts to combine our knowledge of learning with our knowledge of teaching techniques Notable among these efforts are Skinner's work with programmed instruction, Flanders' with classroom interactions, Bruner's with discovery learning, Suchman's with inquiry training, Ausubel's with subsumption theory, and the work of numerous investigators with concept formation

As yet, however, there is no comprehensive theory of instruction for creativity For example, two recent books devoted to the development of instructional media for creativity teaching were concerned almost entirely with research possibilities rather than with results (14, 48) However, many efforts are underway to design and evaluate educational programmes for the facilitation of creative abilities (5, 6, 14, 29, 30, 31, 39, 40, 42, 44, 48, 49, 50, 51, 52, 53) Such work in facilitation of creative potential not only has implications for further instructional techniques but may eventually have sweeping effects for the various theoretical positions in creativity

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