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CREATIVITY

Creativity is a complex and multifaceted phenomenon of human behavior. Early philosophers conceptualized creativity as a mystical characteristic, resulting from divine intervention. The psychodynamic approach viewed creativity as an "unconscious process through which libidinal or aggressive energies are converted into culturally sanctioned behaviors" (Freud, 1924).

Today, the creative *person, process, product, and environment* are the vantage points from which creativity is most often discussed. Psychologists taking the person-centered view focus on individual differences in people's creativity, as well as the distinctive attributes of creative people. The psychometric approach has made a significant contribution to the measurement of creativity in individuals. This approach originated with Guilford (1950) when he urged psychologists to open up research on creativity, which he saw as a long neglected but important attribute of humans. Psychometric researchers developed various measures to assess creativity, but have traditionally focused on divergent thinking ability. The most frequently used measure of creativity is the Torrance Tests of Creative Thinking (1974), which measures divergent thinking by scoring along the dimensions of originality, fluency, flexibility, and elaboration. Other measures of creativity that focus on divergent thinking are batteries developed by Guilford (1959), Getzels & Jackson (1962), and Wallach and Kogan (1965). Critics have emphasized the need to measure processes of creativity other than divergent thinking, such as evaluative thinking and problem identification.

The distinctive characteristics of creative individuals have also been investigated. Consistent among the many descriptions of creative persons are traits and behaviors such as unusual sensitivity to their environment, independence in thinking, nonconforming in their behaviors, and persistence at tasks. Creative people also tend to be open to new ideas and experiences and less accepting of traditional points of view. Exploring ideas for their own sake, a marked sense of humor, a high tolerance for ambiguity, and strong self-confidence in their own work are other common traits of highly creative people.

What happens in the creative process? Wallas (1926) described the process as consisting of four stages: preparation, incubation, illumination, and verification. Torrance defined the process as "one of becoming sensitive to or aware of problems . . . bringing together available information . . . searching for solutions . . . and communicating the results" (Torrance & Myers, 1970, p. 22).

Other psychologists have used experimental and computer simulation methodologies to investigate the creative process. Such approaches usually take place in controlled laboratory environments, rely on quantitative measurement, and seek to determine causality by manipulating variables and measuring its effect on creativity.

Some of the earliest experimental studies focused on the nature of insight (Sternberg & Davidson, 1995). Today, an active area of research is based on the Creative Cognition approach (Smith, Ward, & Fink, 1995), which adopted the

experimental methodologies of cognitive psychology to elucidate the creative thinking process. Creative Cognition researchers have identified two main phases of creative invention that occur in a cyclical fashion in ordinary individuals. During the *generative phase*, the individual generates numerous candidate ideas or solutions and forms a mental representation (referred to as a preinventive structure). Then during the *exploratory stage*, the individual examines the candidate mental representations and ideas and works out their implications. A number of mental processes enter into the generative phase, including retrieval, association, synthesis, transformation, analogical transfer, and categorical reduction. Computer simulations have been conducted to simulate the creative problem solving process, using heuristics derived from the cognitive task analysis of people solving creative problems (Langley et al., 1987).

Leading proponents of the search for methods to teach creative cognitive processing have been Parnes (1967) and Torrance (1979). Parnes developed the Creative Problem Solving Process, a five-step method combining knowledge and imagination in problem solving. Torrance (1979) created a three-stage instructional model—the Incubation Model which integrates creativity objectives with content objectives. More recently, Sternberg has viewed creativity as a decision and has proposed strategies to develop creativity (Sternberg & Grigorenko, 2000). Nickerson (1999) provides further information on different methods to enhance creativity.

Creative products may be ideas, works of art, or scientific theories, provided certain criteria are met. There is a general consensus that creative products must be novel and relevant to a problem, situation, or goal. A relatively recent product assessment method is the Consensual Assessment Technique (CAT) developed by Amabile (1982). According to the CAT, participants are asked to complete some task in a specific domain (such as poetry), and experts in that domain (such as poets) independently rate the creativity of the products. If the interjudge agreement is high, then the mean rating of the judges is used as a dependent measure of creativity (Hennessey & Amabile, 1988).

Psychologists taking the biographical approach to studying creativity have tended to focus on famous real world creators and the personal and environmental factors that affect the quality and quantity of their products. The biographical approach has its roots in Galton (1869), Terman (1925) and Cox (1926). Current biographical researchers apply both qualitative case study methodologies (Wallace & Gruber, 1989; Gardner, 1993) as well as historiometric quantitative measurement (Simonton, 1999).

An environment or situation that is open and accepting is critical for the release and development of creative potential. Csikszentmihaly (1999) argues for a systems model of creativity that focuses on the interrelation of the *domain*, *field*, and the *individual*. The domain consists of a set of rules, procedures, and instructions for action. The field includes all the individuals who act as gatekeepers to the domain. According to the systems model, creativity occurs when an individual makes a change in the information contained in a domain, and that change is selected by the field for inclusion in the domain. Torrance (1962) has suggested that other important variables are those that encourage unusual questions and ideas and those that allow performance to occur without constant threat of evaluation.

The debate regarding the nature of the relationship between creativity and intelligence has not been conclusively resolved. Kitano and Kirby (1986) contend that creativity is distinguishable from general intelligence. That is, "an individual can be extremely bright but uncreative, or highly creative but not necessarily intellectually gifted" (Kitano & Kirby, 1986, p. 192). Other researchers view intelligence as subset of creativity. According to the Investment Theory of Creativity (Lubart & Sternberg, 1995), creativity requires a combination of six distinct but interrelated resources: intellectual abilities, knowledge, styles of thinking, personality, motivation, and environment. It has been estimated that an IQ of at least 120 is generally necessary for high creativity. IQ levels may vary according to the nature of the creative act.

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