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## CREATIVITY AND GENIUS

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Amid the pageantry of the recent turn-of-the-millennium celebrations were numerous newspaper articles and television reports ranking the most influential people of the century, if not the past 2000 years. Each of these lists, whether specific to science, leadership, or athletics, comprised individuals known for their remarkable impact on society, human behavior, and thought. The creative geniuses that top such lists exemplify the heights of human achievement, possibility, adaptability, and even destructive capacity—individuals as diverse as Thomas Edison, Albert Einstein, Martin Luther King, Jr., Napoleon Bonaparte, Pablo Picasso, and Eleanor Roosevelt. It is apparent from our fascination with such lists that our society holds the creative individual and the creative genius as a measure of its own value and well-being. In this chapter we describe the nature of both creativity and the creative genius, their relationship to the positive psychology movement, as well as the strategies that have been developed to measure these phenomena at the individual and sociocultural levels.

### THE POSITIVE NATURE OF CREATIVITY AND GENIUS

The psychological study of creativity and genius fits nicely within the confines of the positive psychology movement. The subject matter entails behaviors that are indicative of psychological health, achievement, and optimal subjective experience. Indeed, at the level of the individual, creativity, originality, and talent are often listed among the general concerns of positive psychology (e.g., Seligman, 1998; Seligman & Csikszentmihalyi, 2000; Snyder & Lopez, 2002). Such concerns entail creativity as a characteristic of the positively flourishing individual as well as the impact of these individuals and the products that they produce on future generations. At the group level, the importance of creativity to the growth, health, and well-being of society cannot be understated. Just a brief scan of our current

environments reveals that we are constantly surrounded by a remarkable record of innovation. We are supported, cradled, and inspired by the thousands of creative treasures produced by the innovative minds of past generations, from the clothes that we wear to the antibiotics in our medicine cabinets, the pages of paper in the books that we are reading to the artwork on the walls around us, the furniture that we sit on to the car that transported us to our present locations, and countless others. This history of creative products and ideas can be thought of as an extension from past to future generations—a cross-generational interconnectedness fostered by the generative possibilities of the human mind.

Creativity and genius has been linked to optimal functioning and health by numerous researchers and theoreticians (Csikszentmihalyi, 1990; Maslow, 1968; May, 1975; Rogers, 1954). The best example of this tradition can be found in the humanistic psychology movement, led by Abraham Maslow and Carl Rogers. This movement describes creative behavior as a manifestation of positive mental health and also emphasizes that such behavior is a direct result of a positive home environment. At the apex of positive mental health is the self-actualized individual. Maslow (1970) examined the self-actualized personality by exploring the lives of such remarkable individuals as Goethe, Einstein, Eleanor Roosevelt, and Frederick Douglass. Self-actualization was hypothesized to give rise to a broad pattern of creative behavior, which Maslow (1968) termed “self-actualizing creativity.” Moving away from common descriptions of domain-specific creativity (i.e., the idea that creative works are only produced by the talented artist, poet, scientist, or composer), Maslow described the self-actualized creator as displaying a predisposition to be creative across a broad number of nonspecific areas (e.g., humor, house-keeping, teaching). This broad-band creativity springs from the self-actualized individual’s characteristic interest in the unfamiliar, the mysterious, and the complex. In addition, Maslow emphasized that these fully functioning, self-actualized creators have the ability to express ideas and impulses without fear of criticism, and thus are better able to produce and express creative ideas. Rogers (1954) theorized that creativity emerges from individuals nurtured in environments that emphasize “psychological safety” (i.e., an environment free of conditions of worth) and “psychological freedom” (i.e., an environment that permits complete freedom of symbolic expression). Research has thus far supported Rogers’s beliefs that positive, free, and safe environments tend to produce later creative behavior (Harrington, Block, & Block, 1987). From this perspective, not only is creative behavior a possibility for everyone, but it is intimately entwined with optimal functioning and health. The humanistic movement describes the creative individual in almost idyllic terms—as generally healthy and well-adjusted, both interpersonally and intrapersonally.

From the sociocultural perspective, creativity is often recognized as a symbol of cultural vitality. The landscape of human history is marked by various peaks and troughs, described as either golden or dark ages, respectively. At their peaks, certain civilizations (e.g., Ancient Greece, Renaissance Italy, Enlightenment Europe) are known for their tremendous flow of creative products and tremendous diversity and wealth of ideas. At the pinnacle of each of these “golden” periods stands the creative genius. Genius is often conceived of as the absolute peak of human performance within a given domain (Simonton, 1994). Indeed, geniuses exist in all domains of human endeavor, including musical composition (e.g., Mozart), the arts (e.g., Shakespeare), sciences (e.g., Einstein), athletic performance (e.g., Michael Jordan), artistic performance (e.g., Martha Graham), and numerous others. The existence and number of geniuses in a given historical period allows for the identification and degree of prominence given to each golden period. We need only to mention the names of Michelangelo, Leonardo da Vinci, or Raphael to obtain an understanding of the tremendous accomplishments of Renaissance Italy; Picasso, Ernest Hemingway, or Gertrude Stein to understand the importance of Paris between the world wars. Detailed studies at the sociocultural level suggest that patterns in the fluctuations of such peaks and troughs in the historical record can be reliably predicted (Simonton, 1975a). For example, the amount of creativity in one generation is positively predicted by the number of geniuses found in the two previous generations—a finding that reveals the importance of role model availability to the creative development of children and adolescents (Simonton, 1975b). Ultimately, our conceptions of genius and cultural or societal vitality are deeply connected.

## DEFINING CREATIVITY

Because of the ambiguities and complexities involved in identifying creativity as well as genius, it is common to encounter the folk belief that such concepts can only be identified intuitively (i.e., “I know it when I see it”). The rigors of empirical research, however, demand that we define such concepts with greater precision. Indeed, how we define such concepts directly affects our measurement strategies and the generalizability of our research conclusions. The construct of creativity has been defined in ways too numerous to describe, but most attempts to articulate this elusive concept usually entail three essential and product-focused criteria (see, for example, MacKinnon, 1962; Rogers, 1954; Stein, 1969).

First, and of greatest importance, is the criterion of *novelty*. A product or idea needs to be new, original, or even shocking to be considered as

possibly “creative.” An artistic forger may be able to replicate Vincent Van Gogh’s “Starry Night” almost to the brushstroke, but as a copy it would not be considered novel and thus not particularly creative. Moreover, a product can be considered novel at a variety of social levels. A product or idea can be considered original to the individual creator, the individual’s family or community, the individual’s subculture or culture, or even the worldwide community. This novelty continuum has often been differentiated by the terms “little c creativity,” which concerns the lower level of the construct, and “capital C creativity,” which concerns a genius-level contribution. It is important to keep in mind that how we define creative behavior—in terms of its novelty—is dependent on the eye of the beholder.

Second is the criterion of *adaptiveness* or *appropriateness* to the problem at hand. Many remarkably novel ideas or behaviors are simply too absurd or ridiculous to ever merit the label “creative.” For example, if an editor at a poetry magazine received a submission that included a series of 1,000 word poems that contain only the word “chicken,” the probability that such works would find their way into the magazine’s pages are quite low. A creative product should not only be novel but also appropriate to the demand of the task, situation, or problem. The boundaries of appropriateness are obviously set by the current standards of each domain.

Third is the criterion of *completeness*. For a work to be considered creative, the work must cross the unique threshold that each domain reserves for completed creative works. For example, an author may devote her career to writing the “Great American Novel,” and she may compose one of the most unique chapters in the history of American literature. However, this very “American” chapter will neither receive the title “Great” nor “Novel” if the author fails to complete the entire work. Once the threshold for completeness is crossed, as nebulous as this boundary may be for a given domain, a product can be judged as creative (e.g., many of da Vinci’s masterworks are incomplete, yet cross the artistic threshold for completed paintings).

## DEFINING GENIUS

For individuals to receive the “creative genius” label, they must not only produce works that meet the previously stated creativity criteria but they must also possess a few key characteristics that differentiate them from the everyday creator. First, the genius is someone who possesses unique or distinctly characteristic creative ideas or behaviors—a concept that we will label *uniqueness*. The notion of uniqueness echoes the original Roman notion of “genius.” (It was believed that each Roman possessed a guardian spirit or genius, which represented that which was unique about each person or

family.) When extended to the realm of achievement, uniqueness refers to the characteristic stamp or impression that an individual makes on a particular field. Whether we are referring to Ludwig von Beethoven in musical composition, Babe Ruth in baseball, Isaac Newton in physics, Goethe in literature, or Napoleon on the battlefield, all geniuses have a unique, immediately recognizable way in which they compose their creative works, manipulate their bodies, or recombine their thoughts and ideas. The unique stamp of a genius is often apparent in the eponyms that follow a particularly important career—such as Darwinian thought, Shakespearean sonnet, or Pavlovian learning.

The second essential component of genius is an individual's social *impact*. The genius's thoughts, ideas, or products have a tremendous impact on the social environment, ranging from other members of the individual's field to the society as a whole. For instance, the genius of Shakespeare can be heard in all current verbal exchanges that use words that he first penned, including "watchdog," "assassination," and "fashionable." The genius is also part salesperson and must be able to convince others of the importance of the creative ideas, products, and behaviors that may change their lives. It is in this way that genius is synonymous with leadership, because an individual is deemed a leader by the very fact that he or she is able to affect an audience of followers. For example, genius inventors are individuals who have the ability to convince others that their lives will be better because of the genius's novel inventions.

These two components of genius are still lacking a third, crucial ingredient: the *quality of intellectual power*. There likely exist numerous cases of individuals who have displayed some unique ability that has distinguished them from others and has had some degree of impact on others; yet if these abilities lack a demonstrated intellectual power or importance, each creator may be doomed to obscurity. For example, the individual in the *Guinness Book of Records* (Russell, 1986) who can smoke hundreds of cigarettes simultaneously has displayed quite a unique ability and has probably acquired a few imitators. Yet this somewhat "impactful" smoker will never be known as a creative genius at smoking, for the power and importance of the act—and, arguably, the thought behind the act—is lacking.

Overall, the creative genius is an individual who brings into being products of undeniable novelty, adaptability to the particular problems of a domain, and completeness. In addition, these creative products bear the indelible stamp that is associated with each genius's unique style of thinking and being, a style that often pervades all aspects of his or her life. The products of genius also affect others—changing the way people think, behave, and experience their lives—and stand as a testament to the genius's tremendous intellectual power. The creative genius, by definition, is poised to have a tremendous and indelible impact on innumerable lives.

## THE STUDY OF CREATIVE GENIUS AT THE LEVEL OF THE INDIVIDUAL

Attempts to measure and identify creative genius usually fall into six somewhat related categories: those that emphasize productivity, eminence, intelligence, cognitive style, personality, or biography. Although psychologists most frequently emphasize the behavior and thoughts of individuals, researchers interested in genius and creativity often use creative products as their primary unit of analysis. Research using creative products has included a wide array of items including, but hardly limited to, poems (Simonton, 1989a; Skinner, 1939), scientific discoveries (Kulkarni & Simon, 1988), musical compositions (Jackson & Padgett, 1982; Simonton, 1995), and dramatic works (Derks, 1994; Simonton, 1983a). In the area of leadership, the creative product can be quantified using discrete legislative bills, elections, or military battles (Simonton, 1980; Suedfeld, Corteen, & McCormick, 1986). Indeed, it is the creative product that is often relied on to gauge productivity and eminence and may be used to infer creative processes in general.

### **Creative Products**

The first quantitative analysis of creativity using productivity as a measure was published by the eminent social statistician Adolphe Quételet (1835/1968). Quételet was interested in the ebb and flow of dramatic productivity across the life spans of famous French and English playwrights. In particular, he examined issues regarding the relationship between the playwright's age and level of achievement, with achievement operationalized in terms of the playwright's productivity (i.e., the number of dramatic works produced). This quantitative approach allowed him to answer questions such as the following: At what age do individuals make their major creative contributions? At what age do they reach their peaks? At what age do their careers come to a close? In a similar tradition as Quételet, Harvey Lehman (1953, 1962) was interested in leadership products as well as creative products. He examined the ages at which leaders occupied various positions of power (e.g., prime ministers, cabinet members, presidents, ambassadors) and the ages at which military commanders led their troops into battle. Dennis (e.g., 1954, 1966) also examined the relationship between age and achievement across various disciplines, but with an emphasis on individual differences. For example, in a study of eminent psychologists, Dennis (1954) studied individual differences in output (in terms of publications) and how the level of output affects the field as a whole (e.g., if one is elected as American Psychological Association president as a result, at least in part, of this output). He found that the top handful of psychological thinkers

were responsible for a disproportionate number of the overall publications produced by the discipline. The use of productivity in the identification of creative genius continues to be fruitfully applied to a variety of topics (see Simonton, 1990).

The primary advantage of using productivity as a measure concerns the convenience of ratio-scale measurement properties (Nunally, 1978). Even though ratio scales make up the bedrock of the physical sciences, interval and nominal scales dominate the measurement landscape of the social sciences. Measures of productivity, however, can assume meaningful values ranging from zero to hundreds of thousands, allowing for clear estimations of relative magnitude and meaningful interpretation. A number of concerns need to be addressed when choosing and measuring creative products. In fact, the primary disadvantage of this approach regards our operationalizations of creative products themselves. For example, should the researcher emphasize quantity at the expense of quality? When measuring the productivity of creative writers, for instance, should we restrict ourselves to only their successful fictional works or should we include all fictional works? Should we also include their works of nonfiction? And if we include their nonfiction works, should we also count the book reviews that they have written or their letters to the editor? Imagine how such questions become even more complex when applied to the realm of leadership. The productivity-centered approach is also limited to content that can be easily quantified. For example, is it possible to quantify everyday events of wit or humor? Unfortunately, some expressions of creativity may remain elusive.

## **Eminence**

Identification strategies focused on creative genius have also used the concept of eminence (i.e., prominence or high position) as a primary criterion. Strategies that emphasize eminence select individuals who have established distinct and enduring reputations in a particular field. Such high reputation echoes our description of the creative genius as having widespread impact and influence on others. Sir Francis Galton was the first researcher to conduct a systematic investigation of genius using samples of eminent individuals. In his landmark book *Hereditary Genius*, Galton (1869) equated genius with reputation, in his words, “The reputation of contemporaries, revised by posterity” (p. 77). Moreover, he believed that reputation was generally heritable. Accordingly, Galton explored family pedigrees of the eminent, which allowed for easy access to a wealth of recorded information. Galton did not limit himself to prominent individuals in the arts and sciences but extended his examination of eminent family pedigrees to areas as diverse as statespersons, judges, divines, commanders, and even famous oarsmen and wrestlers of the North Country! As is apparent from Galton’s work, a

researcher who uses eminence as a selection criterion will be able to pick and choose from an abundance of information regarding creative genius.

The eminence strategy also allows for the quantification of creative genius. An early example of such quantification can be found in the work of James McKeen Cattell (1903). Cattell made the plausible assumption that as each creator's impact on a field and society increases, the amount of attention each receives in a reference work (e.g., biographical dictionary, encyclopedia) should also increase. Accordingly, Cattell (1903) measured the lines of text allotted to each creator across various international encyclopedias. In this manner, Cattell was able to produce an impressive ranking of the 1000 most influential individuals in human history—with Napoleon capturing the top position. Much work has followed the pioneering efforts of Galton and Cattell, successfully implementing eminence as an objective gauge of genius-level achievement (see Simonton, 1999).

There are numerous advantages to the use of eminence as our criterion of genius. The most salient advantage is that eminence measures result in quantitative and highly reliable estimates of an individual's impact on society. Studies of eminent scientists (Simonton, 1991a), visual artists (Simonton, 1984), philosophers (Simonton, 1976), and monarchs (Simonton, 1983b) have produced reliability coefficients indicative of tremendous consensus (i.e., alpha coefficients that hover around .90; see also Simonton, 1991b). This consensus is not limited to majority cultures or simply Western civilization. For example, the measured eminence of creative African Americans displays remarkable consistency across both majority-culture sources and reference works specific to African American culture (Simonton, 1998). Such consensus also cuts across cultural bounds, as can be seen in studies conducted on samples of eminent Japanese and Chinese creators (Simonton, 1988, 1992). Such quantification is certainly more satisfying than the turn of the century armchair rankings of influential individuals.

Equating eminence with creative genius has certain disadvantages as well. Consider that to appear within a reference work, an individual needs to reach a considerable level of recognition. Thus, using eminence as a criterion of genius may result in the exclusion of individuals with limited reputations but who may be potential genius-level creators. For example, women, minorities, and people from disadvantaged backgrounds are underrepresented in the ranks of those judged to be eminent. Researchers attempt to limit the impact of such sample biases by reaching beyond the confines of common reference works. Reference works devoted to the underrepresented and disadvantaged can be used to acquire a very broad sample of eminent individuals. For example, Simonton (1984) compiled a rather exhaustive and diverse sample of 772 artistic creators in his study of the social relationships of eminent visual artists. He achieved such a broad sample by selecting creators from 18 different sources, including general encyclopedias



and field-specific biographical dictionaries and encyclopedias. Ultimately, however, the eminence criteria will only mature as a representative indicator of creative genius as the gaps in the historical record are explored and filled by historians, encyclopedists, and curious scholars.

## Intelligence

For the past century, the concept of intelligence has been linked closely to genius. In fact, some dictionaries define genius as being synonymous with high scores on intelligence tests, or a high Intelligence Quotient (IQ; see, e.g., Mish, 1989). The linkage between genius and high intelligence can be traced back to Galton's original interest in the measurement of natural ability. In addition to his studies of eminent individuals, Galton (1883) was the first person to devise a reasonable set of tests to directly measure individual variation in intelligence. Galton developed numerous anthropometric instruments based on reaction time, the acuity of different sense modalities, and general perceptual abilities. However, these instruments failed as valid measures of intellectual functioning. It was not long after Galton's pioneering work that the first successful measure of intelligence was developed by Alfred Binet and Theodore Simon in 1905. At the foundation of their conception of intelligence was the relationship between a child's mental and chronological age. Mental age could be estimated by giving the child various age-specific tasks (i.e., tasks requiring complex mental functions and cultural knowledge) and simply comparing the child's score to that expected of his or her age group. Later, the ratio of mental to chronological age would be multiplied by 100 to produce what is now known as the IQ. Following this pioneering work, Lewis Terman brought the Binet-Simon test to America and used it to initiate the first longitudinal study of genius. As described in his *Genetic Studies of Genius*, Terman (1925) used his IQ test to identify and predict later occurrences of genius in his sample of gifted children. Terman set the IQ cutoff for inclusion at 140, and acquired a sample of 1528 children (857 males, 671 females) with an average IQ of 151. An IQ score of 140 represents the top 1% of scorers and is now generally considered to represent genius-level intellect. Needless to say, Terman's expectations were quite high for identifying and predicting genius in its youth.

As with measures of productivity and eminence, intelligence tests are also known for their good psychometric properties. In fact, intelligence tests are some of the most reliable tests produced by psychologists (Janda, 1998). However, these tests of intellectual functioning are best at predicting scholastic achievement, not real-world success (Tomlinson-Keasey & Little, 1990). The validity of IQ tests as an indicator of creative genius is also in doubt. The primary criticism of IQ tests in relation to high-level creative behavior is that they concern only a very narrow range of behaviors. In fact, there

may be quite a few intelligences that are not captured by typical IQ tests but that are crucial to genius-level creative performance (Gardner, 1993; Sternberg & Lubart, 1991). For example, should we expect IQ tests, and the verbally oriented items that dominate their content, to predict genius in the visual arts, dramatic performance, athletics, or dance? An additional difficulty is that although IQ is a decent predictor of creativity at lower intelligence levels, IQ becomes a poor predictor of creative achievement after an IQ threshold of approximately 120 (Barron & Harrington, 1981). After the threshold of 120, any additional increase in IQ is less important than other factors, such as motivation and creative ability. Ironically, although great achievements were expected from the gifted individuals in Terman's sample, the only individual tested by Terman who received a Nobel prize—physicist William Shockley—was excluded from the sample because his IQ failed to meet the 140 point cut-off. Incidentally, the individual noted as having the highest IQ on record, an IQ of 228 achieved by columnist Marilyn Vos Savant, is notable not for her work on a cure for cancer or a better mouse trap but for answering reader questions in a Sunday magazine column. Ultimately, those qualities measured by IQ tests, without requisite levels of creativity and motivation, are unsatisfactory in their ability to capture creative genius.

### **Cognitive Style**

It is clear that we must not rely entirely on intellect when attempting to conceive of genius. Genius demands the ingredient of imagination and creative thought. J. P. Guilford (1967) introduced a concept that addressed the distinction between intelligence and creative thought: divergent thinking. In particular, Guilford described intelligence as a cognitive orientation toward convergent thought, or the ability to focus on a single solution to a given problem. Such convergent thought processes are emphasized on most academic and IQ tests. In contrast, Guilford introduced the concept of divergent thought, which can be conceptualized as an individual's cognitive orientation toward the production of multiple solutions to a given problem. Although novel problem solutions are not guaranteed by such an orientation, the more directions that an individual's thought may range certainly increases the likelihood that a creative solution will be found. Guilford and a variety of others (see Runco, 1991) have developed tests to estimate an individual's divergent thinking abilities. Guilford's Alternate Uses Test (Christenson, Guilford, Merrifield, & Wilson, 1960) for example, requires research participants to generate a variety of uses for a common object (e.g., a toothpick, paper clip, or brick). Most commonly, the answers are then scored for originality (i.e., novelty as measured by statistical infrequency or observer ratings), fluency (i.e., the number of ideas given), and flexibility

(i.e., the individual's ability to change set or categories). A similar theoretical orientation can be found in the work of Mednick (1962). Mednick's approach to divergent thought is grounded in his belief that creative thinkers are able to access a wider range of associated ideas than the narrow ranges found for less creative individuals. Mednick constructed a Remote Associates Test (RAT; Mednick & Mednick, 1969) to tap an individual's ability to connect remotely connected ideas. Each of the RAT items consist of three terms (e.g., blue, rat, cottage) that have one or two common associates (e.g., cheese). It was Mednick's belief that the analogical thinking ability required to achieve a high score on this creativity test may be the key to understanding an individual's creative problem-solving processes and ability.

Measures of divergent thinking generally demonstrate high reliability (Hovecar & Bachelor, 1989) and good discriminant validity in relation to intelligence tests (Wallach & Kogan, 1965). Yet the relationship between scores on divergent thinking tests and creative genius may be tenuous at best. Divergent thinking tests are, in general, not strong predictors of real-world creative behavior (Hovecar & Bachelor, 1989). Beyond psychometric concerns, however, is the more insidious assumption that divergent thinking tests are tapping a general creative ability—analogous to Spearman's G (Spearman, 1927) in intelligence research—that should predict creativity, regardless of the domain of creative activity. It is more likely that we should find little to no relationship between scores on divergent thinking tests (especially of the verbal type) and creative performance in domains as various as athletics, physics, or the visual and culinary arts. A demonstrated ability to generate or link remote ideas may be a necessary but not sufficient condition to generate creative performance of the highest degree in domains that range beyond the verbally centered professions. Creative thinking, including its components of information acquisition, expertise, and problem-solving strategies, may be much more domain-specific than previously assumed.

## **Personality and Biography**

Beyond high intelligence and a creative cognitive style, other critical ingredients in the recipe of creative genius remain. The first study to emphasize the relative importance of personality characteristics (e.g., traits, motivations, interests, values) over intelligence was conducted by Catharine Cox (1926) as a part of Terman's larger exploration of intelligence. In contrast to Terman's longitudinal study of intelligence, Cox approached this issue retrospectively. Cox selected 301 of the most eminent individuals on Cattell's (1903) list of the top 1000. This select group contains individuals from a wide array of disciplines, nations, and centuries. The primary goal of her study was to explore the relationship between childhood intelligence

and later creative success. Yet, for a subset of these geniuses, Cox collected a sizable amount of personality data and had each genius rated across 67 different personality characteristics. Although this portion of the study was immensely complex, Cox was able to condense her findings into the observation that creative genius requires high—but not the highest—intelligence, combined with tremendous persistence and motivation. Beyond the personality ratings used by Cox, the traits of creative individuals have been examined using a variety of measures. For instance, Anne Roe (1952) explored the personality characteristics of 64 eminent scientists using measures including the TAT (Murray, 1943) and Rorschach Ink Blot test (Rorschach, 1921). The Eysenck Personality Questionnaire has been used extensively by Hans Eysenck (1995) to tie genius to the personality construct of psychoticism (i.e., a predisposition for both mental illness and creative thinking ability). In addition, Raymond Cattell has used his 16PF personality questionnaire to explore creative individuals in a wide range of areas, from research scientists (Cattell, 1963) to Olympic medallists (Cattell, 1965). Much work on the personalities of creative individuals has revealed a number of defining characteristics, including the ability to persevere in the face of obstacles, an open orientation, the possession of broad interests, curiosity, task absorption, and a high level of intrinsic motivation (Tardiff & Sternberg, 1988). Cattell (1963) also extended his personality research to the realm of biographical data. Cattell began reading biographies of scientific geniuses (e.g., Charles Darwin, Johannes Kepler, Newton, Blaise Pascal) as a simple hobby, but soon realized the value of such detailed personality information and assigned 16PF ratings to each scientist as if each scientist had taken the test himself. Cattell found that the broad personality profile that marked contemporary research scientists was mirrored by the profile that characterized his scientific geniuses (e.g., above average intelligence, prudence, detachment, introversion).

Biographical material is not limited to the study of personality but presents the creativity researcher with a copious amount of other information that may be integral to achievement. For example, it is common for data to be collected regarding developmental experiences, family background, and educational history that may play a crucial role in the development of later creative behavior (see, e.g., Albert, 1980; Goertzel & Goertzel, 1962). Galton was the first researcher to examine these qualities in relation to later success. In particular, Galton (1874) created and successfully implemented the questionnaire as a means to acquire information regarding a variety of personal characteristics (e.g., birth order and its relation to achievement in the sciences). Galton (1874) found that great scientific minds are more likely to be a first born rather than a later born sibling. The pioneer sexologist Havelock Ellis was also interested in the study of biographical characteristics. Specifically, Ellis (1926) explored the lives of 1030 British

geniuses and found similar results to that of Galton's regarding the importance of primogeniture. Even the past decade saw these particular research themes clarified in the work of Sulloway (1996). In addition, J. M. Cattell (1910) studied the biographical characteristics that predict eminence in psychology. Cattell found that father's occupation (e.g., professor or minister) was particularly important to the later success of psychologists.

As with previously discussed measures of creative genius, the primary advantage of personality measures can be found in their consistent demonstration of high reliability. Personality measures including the TAT, 16PF, EPQ, Q-sort, and many others have been extensively examined, normed, and are psychometrically sound (see, e.g., McCrae & Costa, 1997). Biographical information can be easily and objectively acquired on famous individuals, and the reliability of this data can be readily checked across sources. In fact, biographical checklists have been created that make data collection easy, efficient, and quite objective. Yet good biographical data is contingent on its availability and, in some cases, can lead to rather odd samples. For instance, Cox (1926) was forced to narrow her sample of geniuses to 301 because of gaping holes in the extant biographical information on many eminent historical figures. She excluded creators born before 1450 and had to put aside such mountainous intellects as Shakespeare, Machiavelli, and Rabelais because of insufficient childhood data. The most severe criticism of personality and biographical measures, however, is that they lack validity as indicators of creative genius.

It is clear from the variety of different definitions and conceptualizations of creative genius that this construct is complex and multidimensional in nature. Any single measure of creative genius—whether we emphasize productivity, eminence, intelligence, cognitive style, personality, or biography—is doomed to capture only a small portion of such a multifaceted construct. The best approach to conceptualizing and measuring creative genius may be to adopt a multiple measurement strategy. A suitable starting point for such a measure of creative genius may be found in a combination of the previously mentioned factors, such as a composite of personality, intelligence, and productivity measures.

## THE STUDY OF CREATIVE GENIUS AT THE SOCIOCULTURAL LEVEL

Creativity and genius are not only considered characteristics of the individual but can be conceptualized and measured as unique features of a cultural and historical period. Primarily, cross-cultural and transhistorical analytical strategies have been used in the sociocultural exploration of creative genius. Cross-cultural strategies rely on the concept of *Ortgeist*, or

the “spirit of the place,” and emphasize the cultural factors that covary with indicators of creativity and genius. The transhistorical study of creative genius relies on the concept of *Zeitgeist*, or the “spirit of the times,” and used historical period as its unit of analysis. This strategy emphasizes historical trends and cross-generational changes in the prevalence of creative genius.

Cross-cultural studies focus on the creative genius as a quantity specific to a particular culture or geographic region. An early example of this type of research can be found in Alphonse de Candolle’s (1873) response to Galton’s (1869) work on the heritability of creative genius. Contrary to Galton’s work, Candolle was interested in the possible cultural and environmental factors that contribute to the prevalence of creative genius. Candolle’s measures avoided common cultural and ethnocentric biases and allowed him to document a variety of important sociocultural predictors of genius (e.g., economic conditions, climate, political conditions). In addition, research has also revealed some interesting facts regarding the creativity of various cultures. For example, Carniero (1970) compared the complexity of various preindustrial societies and the creativity-related traits each possessed. Interestingly, Carniero found that creativity is a core trait in preindustrial societies—suggesting that these seemingly primitive cultures may have more creativity per capita (i.e., everyone contributes to the creative products of the culture) than industrialized societies that emphasize the solitary creative genius.

Transhistorical analyses of creative behavior are grounded in the observation that creative genius is not evenly distributed across the historical record. The history of humankind can be separated into “golden” and “silver” ages when creative genius is widespread and “dark” ages when the prevalence of creative genius reaches its nadir. Indeed, this ebb and flow of genius clusters has been studied in time-series periods ranging from years and generations to century-long spans (Simonton, 1990; Sorokin & Merton, 1935). Alfred Kroeber (1944) documented the historical peaks and troughs of genius, which he termed “cultural configurations,” in every civilization known to have existed. Kroeber used his rich transhistorical data to decrease the prominence of genetic explanations of creative genius, for such fluctuations in genius would presuppose improbably rapid, periodic changes in the gene pool. Kroeber (1917) also studied the phenomenon of multiples in the historical record (i.e., an event entailing a simultaneous and independent discovery or invention by two or more individuals). It was Kroeber’s contention that the sociocultural milieu, or *Zeitgeist*, not the individual genius, was responsible for the inevitability of various scientific innovations. Price (1963) extended Kroeber’s work by fitting stochastic models to the occurrence of the phenomenon in the sciences and technologies. David McClelland (1961) also adopted a transhistorical approach in his influential work regarding human motivation. For example, McClelland examined the

achievement motive in cultures as historically remote as Ancient Greece, Spain, and England, and compared them to contemporary cultures. He revealed that the positive relationship between demonstrations of the achievement motive (e.g., motives in children's stories, frequency of entrepreneurs) and economic prosperity is consistent across time and culture. Empirical research continues regarding both the transhistorical and cross-cultural predictors of creative genius within the tradition of historiometry (see Simonton, 1990).

The primary advantage of cross-cultural and transhistorical creativity research concerns its generalizability. The rather lofty goal of most scientific psychological research is to discern universal patterns of behavior (e.g., predictors of creative behavior across time and space). Accordingly, the importance of testing nomothetic hypotheses for their cross-cultural and transhistorical consistency cannot be understated. For instance, if we should find environmental predictors of creative behavior in the United States that fail to generalize to societies that feature different political systems, climates, or artistic traditions, our conclusions should not be acclaimed as behavioral universals. Alternatively, when a recurring pattern of creativity predictors is found across cultural, geographical, and temporal distance, its status as a universal phenomenon of human behavior should be commensurately applauded. The primary disadvantage to cross-cultural investigations of creativity and genius concern ethnocentric definitional biases. Unfortunately, Western conceptions and definitions of creativity and genius may lack appropriate analogs in other cultures. For example, if artistic creativity is defined in terms of per capita oil-painting production, a culture lacking a solid tradition of oil painting (e.g., Eskimo culture) may be evaluated as being less artistically creative than most. Narrow definitions that reflect Western values are bound to overlook cultures in which other artistic traditions, such as oral storytelling or ceremonial dance, may be clear demonstrations of cultural creativity. In addition, transhistorical analyses suffer the disadvantage of being reliant on the veracity and availability of historical data. Thus, the universal laws discerned by creativity and genius research must be qualified in relation to data adequacy concerns.

## CONCLUSION

The psychological study of creative genius has produced a wealth of information concerning the lives of the most remarkable and influential individuals ever to have walked the Earth. These creators are not only examples of the heights of human potential, but they can be described also as the architects of the flourishing society. They are responsible for the majority of the products that surround us every day, the myriad ways in

which we communicate, our understanding of the universe, and the ways in which we understand ourselves. A variety of research strategies at the individual and sociocultural levels have produced a clear and compelling portrait of these creative geniuses. Specifically, research has revealed the many cognitive (e.g., associationistic and divergent thought), personality (e.g., an open orientation, perseverance, risk-taking), developmental (e.g., education, early trauma), economic (e.g., high-status parental background), political (e.g., political turbulence, war), and social factors (e.g., mentor availability, collaborators) that characterize the creative genius across culture, time, and geography. Our broad understanding of the creative genius is beneficial not only to psychologists interested in the extremes of human potential but is also integral to our understanding of the everyday creator and optimally functioning human being.

Research regarding creative genius has directly affected the manner in which we conceptualize the everyday creator. For example, anecdotes and empirical studies of genius have helped to guide our understanding of the general features of the creative process (i.e., the preparation, incubation, illumination, and verification stages; see Wallas, 1926), important aspects of the creative person (e.g., flow, domain-relevant skills; see Csikszentmihalyi, 1996), and the environmental factors that give rise to creativity (e.g., factors predictive of intrinsic motivation; see Amabile, 1983). In addition, research regarding the narrow band of factors measured by ordinary IQ tests reveal that IQ alone is an inadequate predictor of genius. For societies to maximize human potential, emphasis must be placed on the combination of factors that result in genius (e.g., high motivation, adequately high intelligence, creative thinking skills, stimulating home environments). Cultures that place intelligence above creative thinking skills and other characteristics important to creative behavior are destined to fail in their quest to produce a future Marie Curie, W. E. B. Dubois, Mozart, or Shakespeare. At the present time, only a handful of academic institutions offer courses that concern creativity and creative thinking skills, and even fewer programs actually offer degrees in creative studies (e.g., The Center for Studies in Creativity at Buffalo State College). Whether or not such creativity-training programs will produce the geniuses of the future remains to be seen, but these programs are certainly contributing the essential ingredients that increase the creative potential and life satisfaction of their students. Regardless, the candle of genius burns bright enough to illuminate a path toward maximizing the potential of all human beings.

There is certain to be a place for creativity research within the positive psychology movement for some time to come. However, research concerning creativity and genius has yet to be recognized as a fully mainstream domain of psychological inquiry. We are certain that the celebrations marking the end of the twenty-first century will feature lists of the creative geniuses



that have shaped society. We hope that such lists will be combined and complemented by the knowledge amassed by mainstream creativity and genius research. We might even wish that among those creative geniuses celebrated in 2099 will be at least one positive psychologist who fathomed the deeper secrets of this personally and socially valued human capacity.

## REFERENCES

- Albert, R. S. (1980). Family positions and the attainment of eminence: A study of special family positions and special family experiences. *Gifted Child Quarterly*, 24, 87–95.
- Amabile, T. M. (1983). *The social psychology of creativity*. New York: Springer-Verlag.
- Barron, F. X., & Harrington, D. M. (1981). Creativity, intelligence, and personality. *Annual Review of Psychology*, 32, 439–476.
- Candolle, A. de. (1873). *Histoire des sciences et des savants depuis deux siècles*. Geneva: Georg.
- Carniero, R. L. (1970). Scale analysis, evolutionary sequences, and the rating of cultures. In R. Naroll & R. Cohen (Eds.), *A handbook of method in cultural anthropology* (pp. 834–871). New York: Natural History Press.
- Cattell, J. M. (1903). A statistical study of eminent men. *Popular Science Monthly*, 62, 359–377.
- Cattell, J. M. (1910). A further statistical study of American men of science. *Science*, 32, 633–648.
- Cattell, R. B. (1963). The personality and motivation of the researcher from measurements of contemporaries and from biography. In C. W. Taylor & F. Barron (Eds.), *Scientific creativity* (pp. 119–131). New York: Wiley.
- Cattell, R. B. (1965). *The scientific analysis of personality*. Baltimore: Penguin.
- Christenson, P. R., Guilford, J. P., Merrifield, P. R., & Wilson, R. C. (1960). *Alternate uses*. Beverly Hills, CA: Sheridan Psychological Services.
- Cox, C. (1926). *The early mental traits of three hundred geniuses*. Stanford, CA: Stanford University Press.
- Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York: Harper Collins.
- Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention*. New York: Harper Collins.
- Dennis, W. (1954). Predicting scientific productivity in later maturity from records of earlier decades. *Journal of Gerontology*, 9, 465–467.
- Dennis, W. (1966). Creative productivity between the ages of 20 and 80 years. *Journal of Gerontology*, 21, 1–8.
- Derks, P. L. (1994). Clockwork Shakespeare: The Bard meets the Regressive Imagery Dictionary. *Empirical Studies of the Arts*, 12, 131–139.

- Ellis, H. (1926). *A study of British genius* (Rev. ed.). Boston: Houghton Mifflin.
- Eysenck, H. J. (1995). *Genius: The natural history of creativity*. Cambridge: Cambridge University Press.
- Galton, F. (1869). *Hereditary genius: An inquiry into its laws and consequences*. London: Macmillan.
- Galton, F. (1874). *English men of science: Their nature and nurture*. London: Macmillan.
- Galton, F. (1883). *Inquiries into human faculty and its development*. London: Macmillan.
- Gardner, H. (1993). *Frames of mind: The theory of multiple intelligences* (2nd ed.). New York: Basic Books.
- Goertzel, V., & Goertzel, M. G. (1962). *Cradles of eminence*. Boston: Little, Brown.
- Guilford, J. P. (1967). *The nature of human intelligence*. New York: McGraw-Hill.
- Harrington, D. M., Block, J. H., & Block, J. (1987). Testing aspects of Carl Roger's theory of creative environments: Child-rearing antecedents of creative potential in young adolescents. *Journal of Personality and Social Psychology*, 52, 851–856.
- Hovecar, D., & Bachelor, P. (1989). A taxonomy and critique of measurements used in the study of creativity. In J. A. Glover, R. R. Ronning, & C. R. Reynolds (Eds.), *Handbook of creativity* (pp. 53–75). New York: Plenum Press.
- Jackson, J. M., & Padgett, V. R. (1982). With a little help from my friend: Social loafing and the Lennon–McCartney songs. *Personality and Social Psychology*, 8, 672–677.
- Janda, L. H. (1998). *Psychological testing: Theory and applications*. Boston: Allyn & Bacon.
- Kroeber, A. L. (1917). The superorganic. *American Anthropologist*, 19, 163–214.
- Kroeber, A. L. (1944). *Configurations of culture growth*. Berkeley: University of California Press.
- Kulkarni, D., & Simon, H. A. (1988). The process of scientific discovery: The strategy of experimentation. *Cognitive Science*, 12, 139–175.
- Lehman, H. C. (1953). *Age and achievement*. Princeton, NJ: Princeton University Press.
- Lehman, H. C. (1962). More about age and achievement. *Gerontologist*, 2, 141–148.
- MacKinnon, D. W. (1962). The nature and nurture of creative talent. *American Psychologist*, 17, 484–495.
- Maslow, A. H. (1968). *Toward a psychology of being* (2nd ed.). New York: Van Nostrand Reinhold.
- Maslow, A. H. (1970). *Motivation and personality* (2nd ed.). New York: Harper & Row.
- May, R. (1975). *The courage to create*. New York: Harper.
- McClelland, D. C. (1961). *The achieving society*. New York: Van Nostrand.

- McCrae, R. R., & Costa, P. T. (1997). Personality trait structure as a human universal. *American Psychologist*, *52*, 509–516.
- Mednick, S. A. (1962). The associative basis of the creative process. *Psychological Review*, *69*, 220–232.
- Mednick, S. A., & Mednick, M. T. (1967). *Remote Associate Test: College adult form I*. Boston: Houghton-Mifflin.
- Mish, F. C. (Ed.). (1989). *Webster's ninth new collegiate dictionary*. Springfield, MA: Merriam Webster.
- Murray, H. A. (1943). *Thematic apperception test*. Cambridge, MA: Harvard University Press.
- Nunally, J. (1978). *Psychometric theory* (2nd ed.). New York: McGraw-Hill.
- Quételet, A. (1968). *A treatise on man and the development of his faculties*. New York: Franklin. (Original work published 1835)
- Price, D. (1963). *Little science, big science*. New York: Columbia University Press.
- Roe, A. (1952). *The making of a scientist*. New York: Dodd, Mead.
- Rogers, C. R. (1954). Toward a theory of creativity. *ETC: A Review of General Semantics*, *11*, 249–260.
- Rorschach, H. (1921). *Psychodiagnostik*. Berne: Bircher.
- Runco, M. A. (1991). *Divergent thinking*. Norwood, NJ: Ablex.
- Russell, A. (Ed.). (1986). *1987 Guinness book of world records*. New York: Sterling.
- Seligman, M. E. P. (1998, Oct.). What is the “good life”? President’s column. *APA Monitor*, *2*.
- Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist*, *55*, 5–14.
- Simonton, D. K. (1975a). Interdisciplinary creativity over historical time: A correlational analysis of generational fluctuations. *Social Behavior and Personality*, *3*, 181–188.
- Simonton, D. K. (1975b). Sociocultural context of individual creativity: A trans-historical time-series analysis. *Journal of Personality and Social Psychology*, *32*, 1119–1133.
- Simonton, D. K. (1976). Philosophical eminence, beliefs, and zeitgeist: An individual-generational analysis. *Journal of Personality and Social Psychology*, *34*, 630–640.
- Simonton, D. K. (1980). Land battles, generals, and armies: Individual and situational determinants of victory and casualties. *Journal of Personality and Social Psychology*, *38*, 110–119.
- Simonton, D. K. (1983a). Dramatic greatness and content: A quantitative study of eighty-one Athenian and Shakespearean plays. *Empirical Studies of the Arts*, *1*, 109–123.
- Simonton, D. K. (1983b). Intergenerational transfer of individual differences in hereditary monarchs: Genes, role-modeling, cohort, or sociocultural effects? *Journal of Personality and Social Psychology*, *44*, 354–364.

- Simonton, D. K. (1984). Artistic creativity and interpersonal relationships across and within generations. *Journal of Personality and Social Psychology*, 46, 1273–1286.
- Simonton, D. K. (1988). Galtonian genius, Kroeberian configurations, and emulation: A generational time-series analysis of Chinese civilization. *Journal of Personality and Social Psychology*, 55, 230–238.
- Simonton, D. K. (1989). Shakespeare's sonnets: A case of and for single-case historiometry. *Journal of Personality*, 57, 695–721.
- Simonton, D. K. (1990). *Psychology, science, and history: An introduction to historiometry*. New Haven, CT: Yale University Press.
- Simonton, D. K. (1991a). Career landmarks in science: Individual differences and interdisciplinary contrasts. *Developmental Psychology*, 27, 119–130.
- Simonton, D. K. (1991b). Latent-variable models of posthumous reputation: A quest for Galton's G. *Journal of Personality and Social Psychology*, 60, 607–619.
- Simonton, D. K. (1992). Gender and genius in Japan: Feminine eminence in masculine culture. *Sex Roles*, 27, 101–119.
- Simonton, D. K. (1994). *Greatness: Who makes history and why*. New York: Guilford Press.
- Simonton, D. K. (1995). Drawing inferences from symphonic programs: Musical attributes versus listener attributions. *Music Perception*, 12, 307–322.
- Simonton, D. K. (1998). Achieved eminence in minority and majority cultures: Convergence versus divergence in the assessments of 294 African Americans. *Journal of Personality and Social Psychology*, 74, 804–817.
- Simonton, D. K. (1999). Significant samples: The psychological study of eminent individuals. *Psychological Methods*, 4, 425–451.
- Skinner, B. F. (1939). The alliteration in Shakespeare's sonnets: A study in literary behavior. *Psychological Record*, 3, 186–192.
- Snyder, C. R., & Lopez, S. J. (Eds.). (2002). *The handbook of positive psychology*. New York: Oxford University Press.
- Sorokin, P. A., & Merton, R. K. (1935). The course of Arabian intellectual development, 700–1300 A.D. *Isis*, 22, 516–524.
- Spearman, C. (1927). *The abilities of man*. London: Macmillan.
- Stein, M. I. (1969). Creativity. In E. F. Borgatta & W. W. Lambert (Eds.), *Handbook of personality theory and research* (pp. 900–942). Chicago: Rand-McNally.
- Sternberg, R. J., & Lubart, T. I. (1991). An investment theory of creativity and its development. *Human Development*, 34, 1–31.
- Suedfeld, P., Corteen, R. S., & McCormick, C. (1986). The role of integrative complexity in military leadership: Robert E. Lee and his opponents. *Journal of Applied Social Psychology*, 16, 498–507.
- Sulloway, F. J. (1996). *Born to rebel: Birth order, family dynamics, and creative lives*. New York: Pantheon Books.

- Tardiff, T. Z., & Sternberg, R. J. (1988). What do we know about creativity? In R. J. Sternberg (Ed.), *The nature of creativity* (pp. 429–440). New York: Cambridge University Press.
- Terman, L. M. (1925). *Genetic studies of genius: Vol. 1. Mental and physical traits of a thousand gifted children*. Stanford, CA: Stanford University Press.
- Tomlinson-Keasey, C., & Little, T. D. (1990). Predicting educational attainment, occupational achievement, intellectual skill, and personal adjustment among gifted men and women. *Journal of Educational Psychology*, 82, 442–455.
- Wallach, M. A., & Kogan, N. (1965). *Modes of thinking in young children*. New York: Holt Rinehart & Winston.
- Wallas, G. (1926). *The art of thought*. New York: Harcourt Brace.