Creative giftedness: beginnings, developments, and future promises

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Abstract. Although the concept of creative giftedness is still a comparatively new one, the benefits of applying research from this area are already making themselves known. Among these benefits are the tremendous advantages of including creativity in models of giftedness. In this chapter we first highlight how creative giftedness research has differentiated itself from intelligence. Next, we will describe four recent models of giftedness (TheThree-Ring Model of Giftedness, the DMGT Model, the WICS Model, and the Feldman developmentalist position) that all involve a creative component. We will also cover recent advances in creativity research that have implications for creative giftedness such as the concept of "mini-c" (as opposed to Big-C and Little-C). In conclusion, we argue the promise of dynamic assessment especially for creativity testing.

Keywords: Giftedness, giftedness models, creativity, creative giftedness, intelligence, dynamic assessment.

Creative Giftedness: an introduction

The defining characteristics of giftedness and the factors that play into being gifted shift frequently. In a recent review of the field, Matthews and Foster (2006) distinguish between two models of giftedness: "mystery models," in which students are labeled gifted but their specific strengths or abilities are not articulated; and "mastery models," which focus more on individual differences and strengths. Many recent models of giftedness are mastery models and detail several specific areas and ways that people can be gifted. Most of these models include *creativity* as a key component.

Creativity researchers and scholars generally agree that creativity involves the combination of novelty and appropriateness. Sternberg, Kaufman, and Pretz (2002) and Baer (1997), for example, state that a product, idea, or behavior must be something new, different or unique to be considered creative. Uniqueness alone, however, is not sufficient to classify something as "creative." Rather, in order for an idea, product, or behavior to be considered creative, it must also be useful, appropriate, or relevant as defined within some socio-cultural context (Plucker, Beghetto, & Dow, 2003). For instance, in order for a child's unique science fair project to be considered creative, it must also conform to the conventions of scientific inquiry and other relevant criteria established by the organizers of that particular science fair. Given this definition of creativity, a creatively gifted child would be considered exceptional in his or her ability (or potential ability) to produce unique and adaptive ideas, solutions, behaviors, and insights.

Although it is a key aspect of many modern models of giftedness, creativity was historically left undiscussed in gifted education. A key reason for this late emergence was that creativity was often confounded with more general conceptions of intelligence and high ability. Increasingly, however, researchers and scholars of gifted education differentiate creativity from intelligence and instead include it as a central part of the gifted experience. Moreover, recent advances in creativity theory expand the definition of creativity and point to exciting new directions for conceptualizing, assessing, and realizing the potential of creative giftedness.

In this chapter, we will briefly highlight how creative giftedness research developed independently from intelligence research, describe some of the recent theories, and then go into more detail about recent advances in creativity research that may have exciting and important implications for giftedness

A brief historical overview

The role of creativity in conceptions of giftedness was not widely acknowledged until more than fifty years after Terman (1916) first used intelligence tests to identify gifted schoolchildren. Prior to that time, giftedness generally translated to little more than high IQ scores and creativity was subsumed within IQ.

There were, however, a few early pioneers who included creativity in their conceptions of giftedness. The post-Sputnik push toward creativity (see Stoeger's chapter on the history of giftedness research, this volume) was led by Calvin Taylor, who spearheaded several conferences and meetings devoted to the study and nurturance of scientific creativity. He specifically focused on the Multiple Creative Talent Teaching Approach, in which a wide variety of abilities and talents (including creativity) would be used to determine student giftedness. Taylor continued to promote the need for science

and schools to recognize the importance of creativity for more than forty years (Plucker, 2003; Taylor, 1984).

Another key pioneer in the area of creative giftedness was E. Paul Torrance. Perhaps his most important contributions were the many tests which bear his name; they are still the primary methods by which creativity is assessed. *The Torrance Tests of Critical Thinking* (TTCT; Torrance, 1966, 1974, 1990; see also 1972, 1984, 1988), according to one comprehensive survey of creativity research (Torrance & Presbury, 1984), were used in 75% of all published studies of creativity involving elementary- and secondary-school students and in 40 per cent of all creativity studies with college students and adults. The Torrance tests dominate the field of creativity research to such an extent that they served as a pivotal criterion in a meta-analysis examining the long-term effects of various creativity training programs (Rose & Lin, 1984).

The TTCT, based on Guilford's divergent thinking work (1967), measures creativity with both Verbal and Figural forms that each have a form A and a form B that can be used alternately. The Figural forms have three subtests:

- *Picture Construction*, in which a participant uses a basic shape and expands on it to create a picture;
- *Picture Completion*, in which a participant is asked to finish and title incomplete drawings; and
- *Lines/Circles*, in which a participant is asked to modify many different series of lines or circles (depending on the edition).

The Verbal form has seven subtests:

- *Asking*, in which a participant asks as many questions as he or she can about a given picture;
- *Guessing Causes*, in which a participant postulates as many possible causes for a pictured action;
- *Guessing Consequences*, in which a participant postulates as many possible consequences for a pictured action;
- *Product Improvement*, in which a participant is asked to make changes to improve a toy;
- *Unusual Uses*, in which a participant is asked to think of many different possible uses for an ordinary item;
- *Unusual Questions*, in which a participant asks as many questions as possible about an ordinary item; and
- *Just Suppose*, in which a participant is asked to "just suppose" that an improbable situation has happened (a made-up example might be, "What if elephants could talk?"), and then list the various ramifications.

Creativity measures and culture-fairness

The advantages of using creativity measures (such as the TTCT) to supplement measures of IQ in determining giftedness is particularly important for children from under-represented groups (i.e., racial, ethnic, and linguistic minority children). Traditional IQ tests historically demonstrate differences between racial/ethnic groups, resulting in an under-representation of minority children in gifted programs and raising concerns about

cultural bias (Gordon & Bridglall, 2005). However, the same cannot be said for creativity tests.

Most creativity researchers discover few differences between African Americans and European Americans. These findings have been fairly consistent regardless of the type of measurement utilized. The TTCT and other divergent thinking measures with verbal and figural forms are used extensively in these studies (e.g., Glover, 1976; Iscoe & Pierce-Jones, 1964; Kaltsounis, 1974; Knox & Glover, 1978; Torrance, 1971, 1973). Studies using questionnaires to measure creative accomplishments (Stricker, Rock, & Bennett, 2001) as well as studies focusing on the ability to be trained on creativity tasks (Moreno & Hogan, 1976) also found no differences between the two groups. Kaufman, Baer, and Gentile (2004) employed poems, stories, and personal narratives written by African American and European American 8th grade students to assess creative differences. Expert judges (individuals with appropriate writing experience) assigned similar creativity scores to both ethnic groups.

Indeed, some of the only differences discovered tend to favor African Americans. Torrance (1971, 1973) found that African American children scored higher on the TTCT than European American children on the Figural tests in fluency, flexibility, and originality. European Americans, on the other hand, scored higher on Figural elaboration and all Verbal subtests. The initial sample compared African American children in Georgia with higher-socioeconomic status children in Minnesota; when Torrance tested European Americans also from Georgia, all differences were significantly reduced. Kaltsounis (1974) also found that African Americans received higher fluency and originality scores on the TTCT.

Differences also emerge when comparing African American students to students in other, non-Caucasian ethnic groups. Troiano and Bracken (1983) gave measures of creative thinking to three kindergarten classes (Dutch Americans, African Americans, and Native Americans). They found that African Americans and Native Americans scored approximately one standard deviation higher on creative thinking, with the most notable difference in fluency, than the Dutch Americans. Kaufman (in press) asked 3,553 individuals (mostly high school and college students) to rate themselves in 56 different domains of creativity. African Americans rated themselves as significantly higher than at least one other ethnicity on all factors; all ethnicities except for Asian Americans rated themselves higher than another ethnicity on at least one factor.

Studies of creativity in Hispanic Americans and European Americans tend to find different results depending on whether the creativity measure is verbal or nonverbal. For example, Argulewicz and Kush (1984) found that European Americans scored higher than Hispanic Americans on three of four TTCT Verbal forms, but found no significant differences on the Figural forms. Studies using only non-verbal assessments have typically found no differences (e.g., Argulewicz, Elliott, & Hall, 1982) or show a slight advantage for bilingual Hispanic Americans (Kessler & Quinn, 1987; Price-Williams & Ramirez, 1971).

Results are less clear for Asian Americans. Artwork produced by American college students was rated as more creative than art produced by Chinese students by both American and Chinese raters (Niu & Sternberg, 2001). A similar study that compared American and Chinese drawings of geometric shapes, however, found that the

two groups were rated similarly for creativity by both American and Chinese raters (Chen et al, 2002). There were no differences in rated artwork between Chinese and British school children, except for the higher ratings earned by Chinese children who attended a weekend art school (Cox, Perara, & Fan, 1998). Another study found that Japanese children produced higher rated drawings than British children (Cox, Koyasu, Hiranuma, & Perara, 2001).

Few studies compare Asian Americans to Americans of different ethnicities. Rostan, Pariser, and Gruber (2002) studied Chinese American and European American students' artwork, with two groups in each culture: students with additional art training and classes and students with no such classes. Each group's artwork (one drawing from life and one drawing from imagination) was judged by both Chinese and American judges. There were no significant differences between cultures from either set of judges, only between art students versus non-art students. Niu and Sternberg (2003) found no significant differences on collage-making and drawing tasks between Asian American students and non-Asian Americans. Chen et al (2005) studied Asian Americans and non-Asian Americans and found no differences in measures of verbal, mathematical, and artistic creativity.

Studies utilizing the TTCT often show Western cultures outperforming Eastern cultures. American college students scored higher on the TTCT than Japanese college students in one study (Saeki, Fan & Van Dusen, 2001), and Americans from five different age groups scored higher than similar individuals from Hong Kong (Jaquish & Ripple, 1984). School children in Hong Kong scored higher on the Figural form of the TTCT than their counterparts in Taiwan, Singapore, and America, but lower than German children; on the Verbal form, the results were in the opposite order (Rudowicz, Lok, & Kitto, 1995). Other means of assessment show mixed cross-cultural results. Malaysian students scored higher than American, Indian, and Hungarian students on one self-report measure of creativity, but American students scored higher than Malaysian students on a different self-report measure (Palaniappan, 1996).

In sum, the development and use of creativity measures has helped to differentiate creativity from IQ and spurred broader, more nuanced conceptions of giftedness, one reason being that creativity measures appear much less culture-dependent than most IQ measures. This differentiation between creativity and IQ serves as an important initial step in addressing historical inequities in determining who will (or will not) qualify as "gifted." Moreover, the recognition that creativity should be considered as a construct in its own right, separate from IQ but central to giftedness, is most clearly seen in the modern models of giftedness in which creativity plays a central role.

Creativity and modern conceptions of giftedness

The Marland Report (1972) was most likely the first official document explicitly including creativity as an integral part of giftedness. Despite its limitations, the report proved a crucial moment for expanding conceptions of giftedness to include creativity. In the years following the Marland's report, scholars of giftedness (recognizing both the importance of creativity and the differences between creativity and intelligence) developed models of giftedness that included creativity in some fashion. In this section, we will briefly consider four such models and examine what role creativity plays in more modern conceptions of giftedness. It is not the purpose of this chapter to outline all

modern theories of giftedness but rather to highlight those that include creativity as a central tenet. We will discuss Renzulli's Three-Ring Definition of Giftedness, Gagné's Differentiated Model of Gifted and Talent (DMGT), Feldman's developmentalist position, and Sternberg's Wisdom, Intelligence, Creativity, Synthesized-Model (WICS). Howard Gardner's Theory of Multiple Intelligences (MI) will also need to be mentioned in this context albeit not being an explicit model of giftedness.

The Three-Ring Model and creativity

Renzulli was one of the first researchers to emphasize creativity in a testable theory of giftedness (Renzulli, 1978). He proposed that there are two types of giftedness: *schoolhouse giftedness* and *creative-productive giftedness*. Schoolhouse giftedness is best described as test-taking or lesson-learning giftedness and is the form of giftedness most often emphasized in school. Creative-productive giftedness refers to an unusual aptitude for generation. In other words, those who display creative-productive giftedness are excellent producers of knowledge while those high in schoolhouse giftedness are superior consumers of knowledge. As Renzulli argues (2005):

> History tells us it has been the creative and productive people of the world, the producers rather than consumers of knowledge, the reconstructionists of thought in all areas of human endeavor, who have become recognized as 'truly gifted' individuals. History does not remember persons who merely scored well on IQ tests… (p. 256)

Emphasizing the need for researchers to identify and promote students who demonstrate potential for producing knowledge, Joseph Renzulli's (1978; 2005) model views giftedness as the interaction of three characteristics: well above-average ability, creativity, and task commitment. According to Renzulli, each characteristic plays an important role in the development of gifted behavior. Well above-average ability is defined by Renzulli as either general ability that can be applied across all domains and/or specific ability, which consists of the ability to perform at a high level within a specific domain. Renzulli defines well above-average ability as that possessed by those individuals performing in the top 15-20% of any domain. This view differs from the traditional view of giftedness as comprising those scoring in the top 3-5% on a standardized measure of intelligence (i.e., Marland, 1972).

There is research evidence supporting the components of Renzulli's model. Delisle and Renzulli (1982) found that nonintellective factors are just as important for creative production as intellectual factors are. The model is also supported by the work of Gubbins (1982), who showed through stepwise multiple regression that above-average ability is a necessary but not sufficient condition for high-level creative productivity. Also of importance are factors such as task commitment, time commitment, and student interest: all of which are factors that are directly related to Renzulli's model.

Renzulli first proposed the three aspects of giftedness based on data from accomplished adults (Renzulli, 1978) and has been criticized for not demonstrating correlations between later life achievements and the traits or experiences of children with various levels of IQ (Delisle, 2003). Nonetheless, his model benefits from its inclusion of multiple interacting factors and the broadening of criteria used in selection of gifted students. In addition, Renzulli emphasized the need to develop creative productive skills in addition to knowledge acquisition and presented evidence that his broadened

identification procedures do indeed reduce inequalities such as a disproportionate representation of minorities in gifted education programs and gender equity (Renzulli, 1999).

The DMGT Model and creativity

Françoys Gagné (2005) proposed a theory of giftedness that emphasizes the talent-development process. Gagné notes that the words *gifted* and *talent* are often used interchangeably (i.e., Marland, 1972) in the field of gifted education, and uses the idea that the two words have independent meanings as a basis for his Differentiated Model of Gifted and Talented (DMGT). The DMGT model is developmental in nature as it posits that talent development corresponds to the transformation of outstanding natural gifts into the skills characteristic of a particular occupational field (Gagné, 2005). Gagné argues that giftedness (or aptitudes) can be described as natural ability in a particular domain, whereas talent (or achievement) is systematically developed skills in a particular talent field (Gagné, 1999). According to the model, natural abilities or aptitudes act as the "raw material" or the constituent elements of talents (Gagné, 1993). Gagné posits that those who belong to approximately the top ten percent of the relevant reference group in terms of aptitudes (for giftedness) or achievement (for talent) merit the label gifted or talented. Gagne also stresses the importance of identifying different levels of giftedness, pointing to the research showing that extraordinarily gifted children (children in the top .001 percent of the population) have different needs than mildly gifted children (those in the top ten percent of the population).

On the *giftedness* side of the model, Gagné defines four aptitudes that have a clear genetic substratum and can be observed in every task children are confronted with in school since environment and learning haven't exerted much influence on them yet. These aptitudes (or *Natural Abilities*) include intellectual abilities (reasoning, memory, metacognition, etc.), creative abilities (imagination, originality, fluency, and so on), socioaffective abilities (for example, perceptiveness, communication, empathy), and sensorimotor abilities (strength, endurance, coordination, to name a few).

On the *talents* side are systematically developed skills such as academics, leisure, technology, arts, social action, business, technology, and athletics.

During the course of the development of gifts into talents, the DMGT model consists of four components that help represent the talent development process. These include three catalysts: (a) intrapersonal catalysts, (b) environmental catalysts, and (c) chance and (d) learning/practice. Catalysts are defined as elements that contribute to the final gifted product. They also vary to the degree which they (a) make a positive or negative contribution to the final product and (b) make a causal impact on the developmental process.

As is the case with any theory of giftedness that incorporates many factors and a large literature, there are concerns that the model both oversimplifies the dynamic and complex processes and relationships (see Baer & Kaufman, 2004; Dai, 2004, Feldhusen, 2004; Porath, 2004; Simonton, 2004) and overcomplicates the distinction between talents and gifts (Guenther, 2004). Still, the DMGT model of talent development makes a strong contribution to the field of gifted education for a number of reasons. First, it helps clarify the definitions of giftedness and talent, two terms that have often been used synonymously in the field. Second, it identifies creativity as one of the key gifted

aptitudes. Even though most other modern theories of giftedness emphasize the distinction between intellectual abilities and creative abilities, they are relatively agnostic as to the influence of genes on these abilities. Gagné's model is therefore unique in its conceptualization of creativity as mostly innate. Third, the model incorporates a great number of factors that serve as catalysts in the development of talents from gifts.

Creativity and Feldman's developmentalist perspective

David Henry Feldman views creativity from a developmental perspective; that is, he asserts that creativity is involved in most any example of developing knowledge (Feldman, 1999; Feldman & Gardner, 2003) - everything from more universal individual advancements in understanding (e.g., a child's understanding of the conservation of matter) to the highly unique, non-universal breakthroughs in thinking (Einstein's theory of relativity). Although he recognizes that creativity is involved virtually all developmental advancements (be they ubiquitous or extremely rare), much of his work is focused on factors that support the developmental advancement of nonuniversal, or eminent, examples of creativity – or, in his words, creative advancements in knowledge that ultimately can be labeled as "works of genius" (see Feldman, 1980, 1986, 1999; Feldman & Gardner, 2003). Thus, Feldman is most interested in the development of creative giftedness (i.e., unambiguous, eminent forms of creativity)

Feldman posited a confluence of factors (or dimensions) that he believes are necessary for understanding the complex, multifaceted and interactive development of creative giftedness. Those dimensions include: (a) cognitive processes, (b) social/emotional processes, (c) family aspects (i.e., birth order and gender within the family), (d) education and preparation (informal and formal), (e) characteristics of the domain and field, (f) social/cultural contextual aspects, and (g) historical forces, events, trends (Feldman, 1999).

According to Feldman's developmentalist perspective, each of these dimensions (and possibly others) interact to establish the conditions necessary for the development and realization of creative giftedness. Feldman (1999) points to case studies of creatively gifted individuals (e.g., case studies of eminent creators developed by Gardner, 1993c; and Gruber, 1981) as a way of instantiating the confluence of these dimensions. Feldman (1999) also points out how these dimensions can delay the recognition of creative giftedness (e.g., Rembrandt's creativity being recognized posthumously) or even impede the development and expression of creative giftedness (e.g., some religions placing restrictions on the careers pursued by females).

Feldman's representation of the development of creative giftedness as being a complex, multifaceted confluence of factors aligns with those of other creativity researchers (e.g., Csikszentmihalyi, 1990; Gardener, 1993; Sternberg & Lubart, 1996). Although his developmental perspective is more of a position than a complete testable theory, his extensive review of the developmental and creativity literature makes a significant contribution with respect to highlighting the complexity and multifaceted nature of the development of creative giftedness.

The WICS Model of Giftedness and creativity

One of the most active giftedness research centers in the country is that of The PACE (Psychology of Abilities, Competencies, and Expertise) Center at Tufts University

directed by Robert Sternberg. The model underlying the PACE Center's research on gifted education is the WICS model (Sternberg, 2003). The WICS theory is domain general in nature, in that the aspects are not tied to a particular domain, but are thought to cut across all learning. In the WICS model of giftedness, giftedness is conceptualized as a synthesis of wisdom, intelligence, and creativity (Sternberg, 2003; 2005).

The first component, *wisdom*, is defined as the application of intelligence and creativity as mediated by values toward the achievement of a common good through a balance among (a) intrapersonal, (b) interpersonal, and (c) extrapersonal interests, over the (a) short- and (b) long-terms, in order to achieve a balance among (a) adaptation to existing environments, (b) shaping of existing environments, and (c) selection of new environments (Sternberg, 2005). According to Sternberg, the wise individual must balance various self-interests (intrapersonal interests) with the interests of others (interpersonal interests) and of other aspects of the context in which one lives (extrapersonal interests). Without wisdom, Sternberg believes the gifted individual may apply their intelligence to achieve selfish means. In order to be truly worthy of the label gifted, the individual needs to seek outcomes that achieve the common good.

The second component, *intelligence*, is based on the theory of successful intelligence in which intelligence is defined as the ability to achieve success in life by capitalizing on strengths and correcting or compensating for weaknesses, in order to adapt to, shape, and select environments, through a balance of analytical, creative, and practical abilities (Sternberg, 1985; 1997; 2000; 2002). Analytical intelligence is required to solve problems and judge the quality of ideas. Creative intelligence is required to formulate good problems and solutions. Practical intelligence is needed to use the ideas and analysis in an effective way in one's everyday life.

The third component of the WICS model, *creativity*, is based on the investment theory of creativity, which views creativity largely as a decision (Sternberg, 2003; Sternberg & Lubart, 1995, 1996). Creative individuals generate ideas that are initially undervalued, and may be rejected by the public. After convincing other people of its value, the creative person will then sell high by leaving the idea to others and moving on to another idea. Also, since creativity is viewed largely as a decision, strategies to develop creativity have been proposed (Sternberg & Grigorenko, 2000). The list of strategies includes (but are not limited to) redefining problems, questioning assumptions, willingness to surmount obstacles, willingness to take sensible risks, tolerance of ambiguity, and self-efficacy.

Even though research into the wisdom component is relatively recent (Sternberg, 1998), the most extensively researched component is the final component: *successful intelligence*. The successful intelligence component shows particular promise in the identification and education of gifted students, minority students and those coming from a lower socioeconomic background (Grigorenko, Jarvin, & Sternberg, 2002; Kaufman & Sternberg, in press; Sternberg, Ferrari, Clinkenbeard, & Grigorenko, 1996; Sternberg, Grigorenko, Ferrari, & Clinkenbeard, 1999; Sternberg, Torff, & Grigorenko, 1998). In addition, Sternberg's research team developed new assessments that may eventually change the way giftedness researchers measure creative giftedness. One new test, the Rainbow assessment, has been found to roughly double prediction of the SAT for freshman college grades in a diverse sample of students and substantially reduce ethnic-group differences in test scores. The assessment measures creative and practical skills in

addition to analytical skills. The creative measures, which required students to provide captions for cartoons, compose oral and written stories, and answer multiple choice questions, were the most useful in increasing prediction (Sternberg & the Rainbow Project Collaborators, 2006).

Although the WICS model received criticisms regarding its scope and application (see Baker & Cote, 2003; Feldhusen, 2003; Heller, 2003), the different components of the WICS model represents a clear example of how creativity occupies a central role in modern conceptions of giftedness and can be applied to a school setting with promising results.

Gardner's Theory of Multiple Intelligences

It is necessary in this context to also mention The Theory of Multiple Intelligences (Gardner, 1983). Although not a model of giftedness as such, its relevance to creativity theory is inevitable, and therefore also relevant when considering creative giftedness in recent models of giftedness. In 1983, Howard Gardner published his first edition of *Frames of Mind*. The book, which became extremely popular among educators, detailed his intelligences model of intellectual ability (1983, 1993a; 1999) and stressed the need for educators and psychologists to broaden their definitions of human intelligence. Although intelligence is the focus of Gardner's theory, MI theory offers an important framework for considering creative development and achievement. In fact, Gardner used his MI theory to examine the relationship between early giftedness and the later achievement of highly creative individuals (Gardner, 1993b). Moreover, MI theory represents an important conceptual shift in expanding what might be considered intelligent behavior and, in turn, has the possibility to broaden the representations of creative giftedness. It does so by addressing a key debate amongst creativity scholars; specifically, the general-domain specificity question in creativity research (see Kaufman & Baer, 2005; Sternberg, Grigorenko, & Singer, 2004). The domain debate centers on the question of whether creativity is domain-general or domain-specific.

Gardner defined intelligence as "an ability or set of abilities that permit an individual to solve problems or fashion products that are of consequence in a particular cultural setting" (Ramos-Ford & Gardner, 1997, p.55). He conducted an extensive review of the literature and defined eight separate intelligences using eight specific criteria (see Gardner, 1983). The eight intelligences he proposed are: linguistic (used when writing a novel. See also chapter on giftedness in literacy by Schnur and Marmor this volume), logical-mathematical (used when solving a mathematical problem), spatial (used when mentally rotating objects), musical (used in performing or composing music), bodily-kinesthetic (used in dancing or playing sports), interpersonal (used in understanding and interacting with other people), intrapersonal (used in understanding oneself), and naturalist (used in discerning patterns in nature). Additional intelligences are currently being considered, such as spiritual and existential intelligence, although Gardner has suggested that Existential intelligence does not exist (Gardner, 1999).

Gardner's theory is largely domain specific in the sense that he highlights certain domains in which each of his intelligences is most important. However, his theory also has a domain general component, as many of his intelligences can apply to a variety of different domains and in different combinations (Connell, Sheridan, & Gardner, 2003).

Gardner's theory has faced several criticisms. These criticisms usually focus on the lack of comprehensive empirical tests of the theory and mixed results pertaining to the psychometric soundness of assessments used to test the various intelligences (cf., Gardner, Feldman, & Krechevsky, 1998; Plucker, Callahan, & Tomchin, 1996; Visser, Ashton, & Vernon, 2006).

Creativity and selected giftedness models in sum

In conclusion, the models of giftedness reviewed in this section represent various modern perspectives on giftedness. Common among them is the recognition that creativity plays a central role in how giftedness is conceptualized. However, conceptions of giftedness shift frequently. Although it seems likely that creativity will continue to serve as a key factor in current and future models of giftedness, the exact role creativity will come to play in conceptions of giftedness remains unknown. Creativity theory and research is an extremely active area of scholarly inquiry. Consequently, new developments in how creativity is (and will be) conceptualized likely will lead to new directions for giftedness; not only in determining what is meant by creative giftedness, but also how creative potential can best be identified and realized. One significant issue currently much discussed concerns how to reconcile the two extreme sides of generality and specificity (cf. Lubart & Guignard, 2004). For instance, the hybrid model (Plucker & Beghetto, 2004) argues that it is important to recognize both domain general (the importance of novelty and relevance) and domain specific (the importance of developing domain specific knowledge) aspects of creativity (an assertion similar to that of MI theory). In addition, the Amusement Park Theoretical (APT) Model (Baer & Kaufman, 2005; Kaufman & Baer, 2004, 2006) puts forth a pyramid of levels of specificity. The APT model begins with initial requirements (things that are true for *any* type of creative act) and moves down to microdomains (distinctions that may be found between writing short stories and writing plays, for example).

In the following we discuss how the most recent advances in creativity theory highlight important new directions for giftedness.

New conceptions of creativity and new directions for giftedness

Traditional approaches to creativity focus on genius, or eminent, creativity (often called Big-C), and everyday creativity (often called little-c). Much of the early work by Terman, for example, focused on students with the potential to reach Big-C (e.g., Shurkin, 1992; Terman, 1924). Perhaps most relevant to creative giftedness in the classroom, however, is a newly proposed construct called "mini-c" (Beghetto & Kaufman, in press). Mini-c creativity has its basis in Runco's (1996; 2004) concept of "personal creativity" as well as recent developmental work involving creativity (Beghetto & Plucker, 2006; Cohen, 1989; Sawyer et al. 2003). Beghetto & Kaufman (in press) define mini-c creativity as novel and personally meaningful interpretations of experiences, actions, and events (which can later evolve into little-c or even Big-C creative contributions).

Beghetto and Kaufman (in press) argue that mini-c is a construct that deserves its own terminology because the current construct of little-c creativity is not inclusive enough to accommodate the personal creative processes involved in students' creative development. Using an ill-fitting definition of little-c creativity can, for example, obscure the standards by which we measure student creativity. We may know they're not at the

Big-C level – most teachers will never have an Einstein in class – but even if we lump them together with everyone else in the little-c category, they get shortchanged. An eighth grade student's insights about how citizens might better make their voices heard in the political process are placed in the same category as the ideas of a noted political scientist – by definition, it is all "little-c." A distinction between Big-C creativity and little-c, Beghetto and Kaufman (in press) argue, is necessary but not sufficient. An additional distinction between little-c and mini-c creativity helps to highlight the importance of considering the developmental nature of creativity (see Table 1 for an overview of this terminology).

Insert Table 1 about here

Consider, for instance, the definition of creativity proposed by Plucker *et al*. (2004): "Creativity is the interaction among aptitude, process, and environment by which an individual or group produces a perceptible product that is both novel and useful as defined within a social context" (p. 90). At the Big-C level, novelty and usefulness are automatically assumed to be present. For example, a discussion of the works of Mozart or Gershwin or Sondheim does not need to start by asserting how their music is new or useful; the larger question instead rests on how these creators have impacted the field of music and influenced generations of young composers.

Although novelty and meaningfulness still serve as the two key definitional components of mini-c creativity, the initial judgment of novelty and meaningfulness is a self-judgment of the creator rather than an external or historical judgment of the creators work and impact. It is this intrapersonal judgment of mini-c creativity that both distinguishes mini-c from and links mini-c to other forms of creative expression. It is a distinguishing feature of mini-c because, unlike little-c and Big-C, creative interpretations need not be novel or even meaningful to anyone but the creator. At the same time, intrapersonal judgment links mini-c to other forms of creative expression because, according to this view, all later forms of creative expression are thought to first start as mini-c (creative interpretations) and only later articulated and vetted interpersonally (little-c) and historically (Big-C).

Mini-c, because it broadens traditional conceptions of creativity, highlights important new directions for giftedness in at least two ways. First, it represents a starting point on the continuum of creativity (Cohen, 1989). As such, research on identifying and educating the creatively gifted must expand its focus to include not only creative achievements (be they little-c or Big-C), but also the genesis of those achievements. This focus is particularly important for the classroom as it highlights the need for researchers and educators to identify and cultivate creative potential rather than simply recognizing creative accomplishments. Indeed, as Runco (2004) noted, a singular focus on creative productivity may leave the potential of those who may be on a trajectory for little-c (or perhaps even Big-C) creativity unrecognized.

Second, mini-c highlights the importance of recognizing creative interpretations of students as important indicators of creative potential. This will require new directions in how creativity is assessed, monitored, and developed. Reliance on traditional measures of creativity will need to augmented or replaced with alternative forms of assessment (e.g., Dynamic Assessments) that are aimed at identifying and monitoring the growing

creative competence of students (see Sternberg & Grigorenko, 2002 for a review of dynamic assessment techniques).

Future creativity testing: the promise of dynamic assessment

As previously mentioned intelligence testing played a central and somewhat unanticipated role in the emergence of research on giftedness and efforts aimed at identifying and educating gifted children. In the early years, the point of being assessed with an IQ test was to get one score that was often treated as a magic number that could open or shut doors of opportunity.

The IQ score itself is not the only part of IQ assessment that is criticized; the tests that generate those scores and the decisions based on those scores are also regarded with some scrutiny. As we mentioned earlier, one key criticism surrounds the potential for such tests to be culturally biased. Given that minority students are both historically and currently underrepresented in gifted programs (Gordon & Bridglall, 2005), such concerns cannot be taken lightly. Although standardized measures of creativity presently have not demonstrated similar problems with respect to (mis)identification of creative ability across ethnic groups, such measures still represent a narrow representation of creativity when considered in light of mini-c. Most standardized assessments of creativity are geared toward a single number or score, mirroring one of the key arguing points in the IQ debate. A more recent philosophy of IQ testing, which we believe can be applied to creativity assessment, is that of *intelligent testing* (Kaufman, 1994; see also Kaufman & Baer, 2006).

Using this system of intelligent testing, the tester is elevated above the test. The single number or score by itself means little; the context is the key component in this holistic method of assessment. During intelligent testing, the persons administering the test are expected to use their qualifications and training and bring their own experience to the testing session. In this manner, the tester can help the child or adult being tested by understanding and interpreting a wide range of behaviors and making inferences about any observed problem solving strategies. Every aspect of psychological assessment is brought into play to interpret a profile of scores in the context of accumulated research. This profile is used to help solve problems and create solutions for the person tested, not merely as a label or classification system (Kaufman, 1994).

A qualified tester using intelligent testing to assess creativity would be well-versed in the fields of social, cognitive, educational, and other appropriate areas of psychology. The pattern of scores in the different domains could be interpreted for its comparative strengths and weaknesses. In addition, an administrator using the intelligent testing approach could look for signs of insufficient motivation, a thinking style that might conflict with the task, or other additional areas that could be improved for enhanced creative potential (see also Kaufman & Baer, 2006).

Such intelligent testing might add to our understanding of students' cognitive abilities and potential by providing additional information beyond that given by scores on other tests (IQ tests, for example). If it could be shown that some race, ethnic group, or gender differences in testing were systematically related to testable differences in creativity, such creativity scores could also shed light on how best to interpret IQ and other test scores of minority group members and perhaps even provide a means to help attenuate error variance due to bias in testing. These hopeful outcomes depend, of course,

on the development of more valid, reliable, and meaningful creativity tests. Alternative assessments, based on a deeper understanding of the full continuum of creativity, may also make this possible.

Dynamic assessments provide a particularly promising alternative to traditional creativity tests. As Kozulin and Garb (2004) explained, the aim of dynamic assessments is to identify and help students realize their potential during the assessment session rather than focus on the already attained knowledge and skills that traditional assessments tend to accentuate. Sternberg and Grigorenko (2002) described two general formats of dynamic assessments: the *cake* format and the *sandwich* format. In the cake format, instructional support is layered between testing items; whereas the sandwich format involves sandwiching instruction between a pretest and posttest. Although there are variations in format, the commonality across most forms of dynamic assessments is the goal of determining what students can do on their own first and then identifying what students can do with assistance from others by providing tailored instructional support. Thus, dynamic assessments are aimed at identifying students' potential and, in turn, helping students realize that potential.

At this point, we are unaware of any researchers using dynamic testing to assess and help realize students' creative potential; however, given the promising results of this form of assessment in assessing academic skills and abilities, we see dynamic testing as an exciting and important new direction for creativity assessment. It may only be a matter of time until researchers and educators adapt this promising technique for creativity assessment. Until then, researchers and gifted educators are advised to at least consider how broadening conceptions of giftedness to include the full continuum of creativity (from mini-c to Big-C) might create opportunities to identify and support creative talent that otherwise would go unrecognized. In order for such opportunities to be realized, researchers and educators need to work together to consider how to better represent the full continuum of creativity in their models, assessments, and instructional practices.

Conclusion

Advances in creativity research will continue to impact theories of giftedness. A more nuanced understanding of creativity in its many forms and its interactions with areas of study such as intelligence, personality, and thinking styles will produce more detailed theories of giftedness which hopefully will offer better prediction of adult eminence (Big-C), and will allow for a more representative assessment of human abilities. As theories of giftedness proliferate, however, there will be an increasing need for theories of giftedness to be precisely defined and measured, for theories to be clear and testable, for conclusions on how to identify and nurture gifted students to be based on solid research findings, for research methods to be well-articulated enough to generate valid and reliable data, and for gifted programs to be evaluated in controlled experimental trials (Mayer, 2005). Nonetheless, this is an exciting time for the field of gifted education in general, and creativity research in particular, with more assessment and curriculum enhancement options available for children than at any other point in history.

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Table 1. *An overview of recent terms in current use to outline various aspects of creativity. Note that terms are in a developmental order: mini-C and Little-C respectively may develop into Big-C.*

Term	Definition	References
mini-C	Personal, novel and personally meaningful interpretations of experiences, actions, events	(Beghetto & Kaufman, in press)
Little-C	Interaction between aptitude, Process and environment producing novel and useful products	(Plucker *at al*, 2004)
Big-C	Fully fledged creative giftedness	(Terman, 1924; Shurkin, 1992)