CHAPTER 19

CREATIVITY

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Creativity is one of those topics that everyone seems to know a little bit about. After all, we all played with crayons in kindergarten and we can all recognize that the creative genius of Bill Gates and Steve Jobs have made our lives better. Yet, where many people assume there is either disagreement or mysticism, creativity researchers tend to agree on several core components of creativity and have developed many highly-used theories to understand creativity and help support its application in practice.

There is consensus from the early days of creativity research (F. Barron, 1955; Guilford, 1950) to present day (Diedrich, Benedek, Jauk, & Neubauer, 2015; J. C. Kaufman, 2016b; Simonton, 2012) that to be creative, two fundamental qualities must be present. The first, somewhat obvious quality, is that something must be original or new in some way to be creative. For example, the act of reciting the pledge of allegiance or tying shoelaces are typically not considered creative acts. Yet, originality is not enough, the second quality involves task appropriateness. For example, if someone is asked to wash the dishes and he or she decides to throw them out instead, this is a different response but not one that is particularly desired. In other words, it is not appropriate for the task at hand; dishes (unless they are paper plates) are not meant to be used once and then smashed. A creative response is one that that is original and task appropriate. Building a machine that automatically takes dishes out of the sink, washes and dries them, and puts them back in the cupboard would be quite creative (as would finding a way to bribe your younger brother to do the chore for you).

Simonton (2012) expressed this relationship in a multiplicative way: creativity = originality × task appropriateness. In this equation, if either originality or task appropriateness is zero, then the overall creativity would be zero. A child may want to be a pomegranate tree when he or she grows up, which may be an original desire, however, he or she is unlikely to change his or her DNA to grow fruit. This ideal career is not task appropriate and, thus, not creative.

Originality and task appropriateness are not the only possible components of a creativity definition. Some argue for surprise or unplanned cleverness (Boden, 2004). Others suggest that there is an element of high quality (Sternberg, 1999; Sternberg, Kaufman, & Pretz, 2002) or value (Hennessey & Amabile, 2010).

Such a definition gives us certain parameters, yet leaves many gaping questions. Imagine a 6-year-old girl, Katrina. Her art teacher hands out long sheets of butcher paper and asks the class to draw their visions of outer space. Katrina draws a gold circle in the center, adds a large black dot, and then signs her name and hands in her work. That evening, Katrina's mother gets a concerned phone call from the art teacher. The other children, the teacher says, drew spaceships, planets, and stars. Might Katrina be a bit of a slow learner? When the mother gently asks Katrina about the incident, the girl rolls her eyes and says, "Mom, it was the universe before the big bang!" Is Katrina creative? Certainly, her work was original and, apparently, task appropriate. This example points to the need for more than a basic definition.

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HISTORICAL AND CONTEMPORARY PERSPECTIVES

Guilford's (1950) presidential address to the American Psychological Association is often cited as a gateway moment in the field of creativity research. There were researchers before 1950, but most focused on related constructs, such as genius or intelligence. Indeed, Guilford's own approach was rooted in cognition. His structure of intellect model (1950, 1967) included creativity as manifested by divergent and convergent thinking. *Divergent thinking* is the ability to generate many different potential solutions to an open-ended problem. This concept is a cornerstone of creativity measurement. *Convergent thinking* is the ability to choose the best possible solution from among many potential ideas. Many conceptions of creativity still include divergent and convergent thinking.

Another early way of thinking of creativity is the framework proposed by Rhodes (1962), who introduced the Four P's—person, process, product, and press (e.g., environment)—as a framework. In essence, it conceptualizes how creativity can be studied. There is the creative person (who is creative?), the creative process (how are they creative?), the creative product (what is created?), and the creative press (in what circumstances are they creative?). Glăveanu (2013) recently extended the Four P's into the Five A's by introducing the idea of context, such that a person is transformed into the actor, the process becomes the action and the product becomes the artifact. The press is divided into two new ideas, of the audience (who consumes the creative work?) and the affordances (what are the resources available to the creator?)

Plucker, Beghetto, and Dow (2004), in synthesizing the definitions used in the literature, proposed a definition that combines the standard components of originality and task appropriateness with the Four P's: "Creativity is the interaction among aptitude, process, and environment by which an individual or group produces a perceptible product that is novel and useful as defined within a social context" (p. 90).

The inclusion of context plays an important role in making determinations about creativity. Building on Simonton's (2012) equation, Beghetto and Kaufman (2014) added sociocultural context to the equation:

$$\text{Creativity} = \text{Originality} \times \text{Task Appropriateness} \; [\text{—Sociocultural Context—}]$$

This equation highlights that originality, task appropriateness, and creativity are all defined within a particular sociocultural context. This helps clarify questions such as: Can we call a child's original and task appropriate short-story creative even though it might not meet the standards of originality necessary for publication in a literary magazine? The inclusion of context helps address this question. In the context of the child's elementary school, his short story can still be considered creative, even though it is not at the same level of creativity necessary for professional publication (or for a scientific discovery, Broadway production, or national advertising campaign).

Context also helps us address the question raised earlier in the example of Katrina. Katrina's drawing can be considered creative in the context in which she drew it, but importantly that context was not clearly recognized (or communicated) to her teacher. In this way, part of developing one's creative potential is learning how to "read the situation" (J. C. Kaufman & Beghetto, 2013b). Creative metacognition is the ability to recognize one's creative strengths and weaknesses, but also being able to understand moments to express creativity and knowing when to hold on to ideas to be developed at a different time. It is possible that any anticreativity attitudes that may surface in the classroom (or life) reflect a dislike of people with low creative metacognition, as opposed to a dislike of creative students (J. C. Kaufman, Beghetto, & Watson, 2016).

RELEVANT THEORY AND PRINCIPLES

Another way of approaching the field of creativity is to consider a developmental trajectory across the lifespan. One theory that takes this perspective is the Four C model (Beghetto & Kaufman, 2007, 2014; J. C. Kaufman & Beghetto, 2009, 2013a). The Four Cs grew out of an initial distinction between

little-c creativity and Big-C creativity. Some scholars emphasized little-c, or everyday creativity, which consists of the types of creative activities that children and laypeople do every day (e.g., combining leftovers to form a new meal, making up a bedtime story, a child to using duct tape to fix a broken table). It would also include the type of creativity often seen at county fairs (e.g., birdhouses, paintings by local artists). In contrast, Big-C creativity is creative genius, the type of eternal, everlasting work that shapes the world and is appreciated across generations.

Building on the idea of little-c and Big-C creativity, the Four C model added two additional categories: mini-c (Beghetto & Kaufman, 2007) and Pro-c (J. C. Kaufman & Beghetto, 2009). Mini-c creativity is the creativity inherent in the learning process and serves as the genesis for later levels of creative expression. Specifically, mini-c creativity represents new and personally meaningful discoveries that serve as the basis for new (albeit subjective) understanding, insights, and ideas. Mini-c insights may seem to break the "rule" of creativity needing to be judged original and task-appropriate in that mini-c creativity needs only to be new and relevant for the creator. This again is where context plays a critical role. In the context of one's personal experience, new and personally meaningful insights can still be considered creative. Someone might discover a new way to solve a problem that has been known for years but represents a personal "a-ha" moment. Other times, connections between concepts only may be clear to the person having the ideas. When mini-c ideas are communicated, developed, and valued by other people, they have risen to the level of little-c creativity. The development of mini-c insights into little-c contributions often requires feedback from others (see Beghetto, 2007, 2016; Beghetto & Kaufman, 2007, 2014). In this way, mini-c creativity simultaneously supports the development of personal understanding and also serves as the basis for making creative contributions to others.

Pro-c creativity is a development of little-c creativity. Someone may engage in a creative activity for years (either with or without formal training, often depending on the domain) and eventually reach a level of expertise and accomplishment that is a step above little-c, but not at the genius-level status of Big-C. For example, after dabbling in poetry, an individual may become successful enough to begin publishing his or her works and earning a salary as a poet. As his or her work becomes widely read, he or she begins to develop a fan base and a community of poets. Because he or she not only earns a living as a poet, but also is accepted by other poets as an excellent writer of poetry, he or she can be recognized as a Pro-c poet. However, the question of a Pro-c creator's legacy is unclear. Many poets esteemed in their day are forgotten today, whereas others are still read.

Many other creativity theories can be seen within the lens of the Four C theory. For example, Csikszentmihalyi's (1990, 1996) concept of flow is an illustration of the creative process that can occur at any level. Flow occurs when one is engaged in an activity of interest and becomes intensely absorbed by the task. Someone in flow might lose track of time and forget everything else. People can enter flow in many ways (e.g., through sports or physical activity), but it is often applied to creativity (e.g., while playing the piano, carrying out a scientific experiment, writing a story; see Chapter 14, this handbook).

There are several creativity theories based on little-c creativity, including the investment theory of creativity (Sternberg & Lubart, 1995), which proposes that the key to being creative is to identify ideas that have received only minimal attention, pursue these ideas, and then convince others of their importance. Once others agree and have begun to jump on the bandwagon, a creative thinker would move on to a different (less popular) idea to pursue. Sternberg and Lubart (1995) included six variables as being the foundations of creativity: intelligence, knowledge, personality, environment, motivation, and thinking styles. Another little-c theory is Amabile's (1996) componential model of creativity, which presents three broad variables that enable creativity: domain-relevant skills (talent, technical know-how, and domain-based knowledge); creativity-relevant skills (general personal traits, e.g., being open to

experiences); and task motivation (deep interest and passion for the material).

An example of a Pro-c theory is the propulsion theory of creative contributions (Sternberg & Kaufman, 2012; Sternberg, Kaufman, & Pretz, 2001, 2003). This theory discusses the importance of creativity in moving ideas and fields forward, and explores the relationship between the domain and the creator. The propulsion theory allows for the measurement or categorization of creativity into levels of contribution (e.g., replication, redefinition, forward incrementation, redirection, reinitiation, and integration). The most basic contribution is replication of previous work. At this level, reproduction of work can add to the strength of an argument or act as preservation. Redefinition seeks to take a new look at past work from a different perspective and adds to, or offers changes to, points of view. Forward incrementation and advanced forward incrementation move the domain forward and add new information and creative understanding, albeit maintaining the trajectory of domain growth. Redirection and reconstruction also add to the domain; however, they reject aspects of the previous direction to alter the trajectory and features of the field. Reinitiation seeks to completely revolutionize a domain by returning to the starting point and beginning anew. This is with the intention of restarting a field. Finally, integration or synthesis seeks to combine divergent domains to obtain cross-field understandings with new knowledge and conceptions. The propulsion theory allows for rejection and preservation of domains as problems are presented and creative solutions are required.

An example of Big-C theory is Csikszentmihalyi's (1996, 1999) systems model, which explores the interaction between the creative person, the domain (the area of study, e.g., psychology), and the field (the gatekeepers, e.g., journal editors, admissions committees, granting agencies). The domain and the field change over time, so that ideas that may have once been considered creative may no longer be creative as the gatekeepers and the members of the domain change. For example, many treatments of mental illness that were once considered highly creative would now be considered cruel and unethical and would now constitute malpractice.

RESEARCH REVIEW

Creativity research is an active, ongoing topic that spreads across not only psychology and education but also business, neuroscience, engineering, and many other disciplines. This chapter will take a more individual-based approach and examine how creativity is related to other constructs such as personality, intelligence, and motivation.

Most studies of the creative personality use the five factor theory of personality as a starting base (e.g., Goldberg, 1992). The five factors, representing a continuum of behaviors and traits, are agreeableness, conscientiousness, extraversion, neuroticism (sometimes referred to as its opposite dimension emotional stability), and openness (sometimes called openness to experience).

Openness is the factor most consistently found to correlate with creativity across many different types of measures (e.g., self-reports of creative activities; Ivcevic & Mayer, 2009; Jauk, Benedek, & Neubauer, 2014), particularly in the arts (Hong, Peng, & O'Neil, 2014); on divergent thinking tests (Sánchez-Ruiz, Hernández-Torrano, Pérez-González, Batey, & Petrides, 2011); and on rated creativity in stories (Wolfradt & Pretz, 2001), autobiographical photo essays (Dollinger & Clancy, 1993), and metaphors (Silvia & Beaty, 2012).

Conscientiousness shows a complex relationship with creative performance, in part because of a strong domain interaction. Creativity in the arts generally is negatively correlated with conscientiousness (Furnham, Zhang, & Chamorro-Premuzic, 2006), but creativity in science (Feist, 1998) and business (Larson, Rottinghaus, & Borgen, 2002) is positively correlated. Extraversion is sometimes related to creativity (Martindale & Dailey, 1996), particularly in the arts (S. B. Kaufman, 2013). There are slight negative relationships between agreeableness and creativity in science (Silvia, Kaufman, Reiter-Palmon, & Wigert, 2011). The relationship between creativity and neuroticism (or most facets of mental health) is inconsistent and controversial (e.g., J. C. Kaufman, 2016a).

DeYoung's (2015) cybernetic Big Five is a new approach to the Big Five that, among many other nuances, splits openness into two specific subfactors: intellect and openness (although given the same name as the larger factor, this subfactor is more experiential, e.g., wanting to do new things). Nusbaum and Silvia (2011) studied the openness/intellect subfactors and creativity and intelligence. Openness (but not intellect) predicted creativity and intellect (but not openness) predicted intelligence. S. B. Kaufman (2013) constructed a four-factor model of openness comprised of affective engagement, aesthetic engagement, intellectual engagement, and cognitive ability. Intellectual engagement and cognitive ability were associated with self-reported creative achievements in science. Affective engagement was positively related to performing arts creativity and negatively related to scientific creativity. Aesthetic engagement was related to artistic and performing arts creativity.

There is similar nuance in the relationship between creativity and intelligence. Like personality, there are many theories of intelligence. Some studies simply look at general intelligence (*g*). Many initial studies looking at *g* and creativity argued for a "threshold" theory (F. Barron, 1963; Getzels & Jackson, 1962), which holds that creativity and intelligence are positively related up until an IQ of approximately 120. For people with IQs higher than 120, the relationship between intelligence and creativity is small. More recently, as more sophisticated theories of intelligence and creativity have come in vogue, this theory has lost favor. Some recent work maintains support for the threshold theory (Jauk, Benedek, Dunst, & Neubauer, 2013), but other studies do not show this pattern (e.g., Preckel, Holling, & Wiese, 2006). Kim (2005) conducted a meta-analysis of IQ and creativity and found very small positive correlations ($r = .17$) regardless of intelligence level.

Moving beyond *g,* the Cattell–Horn–Carroll (CHC) model of intelligence (Flanagan, Ortiz, & Alfonso, 2013; Horn & Cattell, 1966) expanded on the *Gf–Gc* theory, which proposed two types of intelligence—fluid intelligence (*Gf*), which is the ability to solve new problems, and crystallized intelligence (*Gc*), which is acquired knowledge. The CHC model includes *Gq* (quantitative knowledge), *Grw* (reading and writing), *Gsm* (short-term memory), *Gv* (visual processing), *Ga* (auditory processing), *Glr* (long-term storage and retrieval), *Gs* (processing speed), and *Gt* (decision speed/reaction time).

Several studies have shown a connection between *Gf* and creativity (Batey, Chamorro-Premuzic, & Furnham, 2009; Silvia & Beaty, 2012). However, in the CHC model, creativity is placed not with *Gf* but with *Glr.* Creativity is conceptualized in the model as being able to retrieve an original and appropriate response from your memory (i.e., long-term storage) in response to a question or task. Recent studies have shown a connection between *Glr* and creativity as well (Avitia & Kaufman, 2014; Silvia, Beaty, & Nusbaum, 2013).

Motivation, like intelligence and personality, is the source of a large body of interrelated, and sometimes contradictory, research. Someone who is intrinsically motivated is performing an activity because he or she enjoys it or gets personal meaning out of it; intrinsic motivation has traditionally been associated with higher creativity (Amabile, 1996). In contrast, extrinsic motivation is doing something for an external reason, such as grades, money, or praise (Deci & Ryan, 1985, 2010; Ryan & Deci, 2000). In other words, an individual is driven to do something because he or she likes to do it and believes it has great worth, or because he or she is receiving an external reward, such as payment. Neither type of motivation is inherently better or worse.

Choice is often discussed as a large part of intrinsic motivation (Cordova & Lepper, 1996). People tend to enjoy tasks less when they are forced to do them. Interestingly, however, the importance of choice is mostly a Western phenomenon; choice was much less of a determinant of intrinsic motivation for Asian children than their American counterparts (Iyengar & Lepper, 1999). If choice may or may not be related to what motivates us, depending on the culture, our goals are definitely a key aspect (K. E. Barron & Harackiewicz, 2001; To, Fisher, Ashkanasy, & Rowe, 2012). There are learning goals (also called mastery goals), in which an individual does something because of the learning he or she achieves while doing it. Another type of goal is the

performance goal—an individual is focused on how well he or she performs a task and is less concerned with how much he or she learns while doing so (Midgley, 2014). Performance goals can be further split into two types: performance-prove, in which an individual wants to show that he or she can do well, and performance-avoid, in which an individual wants to avoid looking incompetent.

Learning goals are associated with intrinsic motivation. If the goal is to learn how to do something, then an individual is more likely to be doing it out of enjoyment or for the meaning of the activity. Performance goals are associated with extrinsic motivation. If the goal is to get a perfect final product, an individual is more likely to be doing the task for a reward or external value.

One potential problem is that rewards can have a hidden cost (Lepper & Greene, 1975; Lepper, Greene, & Nisbett, 1973). If an individual offers people a reward to do something that they already find interesting, then he or she may decrease intrinsic motivation. If an artist enjoys drawing pictures and another person starts giving the artist money for drawing pictures, then the artist may choose to draw fewer pictures for his or her own enjoyment. According to this theory, offering extensive praise, rewards, or performance incentives may backfire on already dedicated and passionate workers and students (e.g., Kohn, 1993).

Extrinsic motivation, then, impacts creativity to the extent that individuals are constrained by evaluation and the praise associated with being positively evaluated. Furthermore, when individuals are worried about their creativity being judged, they are less likely to be creative (Amabile, 1979). However, if the rewards are more nuanced, or individuals are rewarded for being creative, or directly told to be creative, their creativity was not negatively impacted (Hennessey, Amabile, & Martinage, 1989).

One way to begin discussing intrinsic motivation as an aspect of creativity is to think about creativity as a function of intrinsic motivation. In other words, when an individual is intrinsically motivated to study a subject, complete a task, or to learn, it is not a huge stretch to imagine that he or she will likely be more creative in process. As Amabile (1996) argued, intrinsic motivation frees the individual from the constraints or concerns regarding the context of the situation, and therefore allows a person to be more focused on the task and creative production associated with task completion. Another way intrinsic motivation comes into play is during Csikszentmihalyi's (1990, 1996) conception of flow, or optimal experience, discussed previously. Flow is achieved more readily when an individual is highly motivated to work on the task and highly interested in the subject.

PRACTICE AND POLICY ISSUES

A common broad goal of current curricula is to ready students to operate successfully in the world after completing their K–12 education (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2015). Additionally, current foci of curricula include 21st century skills and standards of practice that stress the importance of sense making, problem solving, and communication (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2015). Given this priority, it is unsurprising that a recurring recommendation is creativity. If the education system is tasked with preparing students for a world that does not yet exist, then it needs to better enhance and nurture their creativity. Students will ultimately face problems that require innovation and technology not yet conceptualized. Indeed, creativity has been called the most important economic resource for this century (Florida, 2002).

One major pitfall that has historically plagued the K–12 education world are the "be creative, but not too creative" narrative often communicated to students. Another pitfall has been the marginalization of highly creative students (Diakidoy & Phtiaka, 2002). For example, several studies have found that teachers value creative students less than they value bright students, in part, because they associate creativity with nonconformity, impulsivity, and disruptive behavior. More broadly, teachers may not necessarily have a strong understanding of creativity (Aljughaiman & Mowrer-Reynolds, 2005). For example, when teachers reported liking creative students, they then proceeded to define creativity with adjectives such as *well-behaved* or *conforming*

(Westby & Dawson, 1995). When the same teachers were given descriptions of creative students using adjectives more supported by researchers, their positive ratings turned negative.

We argue that a "knowledge is power" approach can alleviate these potential hazards. As teachers recognize their own biases and shift their mindsets, their negative associations will decrease. Part of this approach is to reinforce the idea that creativity may require behavior that initially seems unconducive to a stereotypical classroom environment. Even a slight exposure to some of the research on creativity can empower teachers to best serve a wide variety of students (Beghetto, 2010; Beghetto & Kaufman, 2016; Beghetto, Kaufman, & Baer, 2014). Any discussion of how gifted students can thrive should include a note of how creativity can be cultivated in education.

How can teachers align the Common Core Initiative, process skills, real-world classroom focus, and 21st century global skills with the desire to nurture creativity? One way is to foster intrinsic motivation in the classroom. There are three key points to follow: (a) students should be taught about a malleable mindset—the idea that students can increase their intelligence through hard work, (b) students who are told to be creative often increase creativity, and (c) intrinsic motivation and creativity is increased when students are offered feedback that encourages risk taking and avoids penalizing failure, which mitigates the effects of creative suppression.

Dweck (1986, 2000) described the interaction between mindsets and the classroom. Dweck explained that students with a fixed mindset (who do not believe hard work will make them smarter and believe that they are born with static intelligence) tend to respond poorly to failure. She explained that students with a malleable mindset believe that they are able to get smarter through hard work and, accordingly, see failures as a potential jumping off point to get smarter.

Much of the core work on classroom environments has grown out of Amabile and Hennessey's work on intrinsic and extrinsic motivation (Amabile, 1996; Hennessey, 2010, 2015; Hennessey, Amabile, & Martinage, 1989; Hennessey & Zbikowski, 1993). For example, rewards (such as gold stars, small treats, or extra credit) may seem like a way to get students to be more creative. The risk, however, is that the rewards will trigger extrinsic motivation and lead students to become more interested in the reward than the process of the task, lowering intrinsic motivation. Given that intrinsic motivation is tied to increased creativity, the specific circumstances surrounding a reward become important. In the workforce, for example, employees with high creative self-efficacy can benefit from rewards (Malik, Butt, & Choi, 2015). In the classroom, however, the potential positive impact of rewards is less established, although the negative impact of rewards can be reduced if they are not made salient (Eisenberger & Selbst, 1994) or tied to routine performance (Eisenberger & Shanock, 2003). Rewards are not the only potential killer of creative motivation. Time limits, social comparison and competition, public evaluations, and even praise can all potentially decrease student creativity (Hennessey, 2010).

One key environmental factor that provides opportunities for supporting creativity are called micromoments (Beghetto, 2013b). These are surprising moments in the classroom, such as when a student shares an unexpected idea. Micromoments offer the chance for a teacher to recognize and support creative expression as it happens. Understanding how to navigate such moments is critical; otherwise teachers may inadvertently dismiss students' potentially creative ideas. Over time such dismissals can undermine students' willingness to share their own unique and personally meaningful (mini-c) ideas (see Beghetto, 2013a). When this happens, the exchange of ideas can devolve into a game of "intellectual hide and seek," in which students focus on guessing what teachers want to hear and how they want to hear it (Beghetto, 2007, 2010).

Even worse is the possibility of *creative mortification* (CM; Beghetto, 2013a, 2014; Beghetto & Dilley, 2016). CM refers to the loss of one's willingness to pursue a particular creative aspiration following a negative performance outcome. CM can thereby arrest the development of creativity (Beghetto & Dilley, 2016) and result in talent loss. This can occur when a student experiences the combination of shame and a belief that improvement is not possible. In such cases, a young person may feel that

continuing to pursue a creative aspiration is an exercise in futility and abandon it. Of course, not all young people will experience creative mortification after a negative performance outcome. A key external factor that can influence creative development and, in particular, how young people experience negative outcomes is feedback (Beghetto & Dilley, 2016; Beghetto & Kaufman, 2007).

Beghetto and Kaufman (2007), for instance, described the Goldilocks principle, which holds that feedback should be neither too hard, nor too soft. Hard feedback is feedback in the harsh tones that can stifle creativity (and perhaps even lead to creative mortification). Yet soft feedback, filled with undeserved praise and general compliments that ignore genuine flaws, can lead to people not being in touch with their actual levels of creative ability (J. C. Kaufman, Evans, & Baer, 2010). How might teachers, parents, and coaches provide feedback? Beghetto (2005) offered several specific recommendations. Teachers should set challenging goals for students. They should encourage them to find aspects of an assignment that hold personal relevance. They should minimize to whatever extent they can the external forces of assessment. Teachers should encourage students to learn from mistakes, not to avoid them. Additionally, consistent with Dweck's (2000) mindset theories, teachers should create environments that emphasize performance over feedback. When teachers offer too many criticisms, even if well intentioned, students are less likely to find their own problem-solving solutions (Gibson & Mumford, 2013). Davies et al. (2013) reviewed studies on creative learning environments and identified several factors that could help support creativity, including collaboration with peers and local groups, working outside of school, and a game-based approach to learning.

FUTURE CONSIDERATIONS AND DIRECTIONS

As a field, creativity is continually growing and changing, as our understanding of creativity, the individual, and sociocultural influences evolves. A driving force of global change has been the explosion of technology and technological access over the past few decades. For creativity researchers, the abundance of public data now available about huge portions of the global population, as well as new trends in virtual social interaction, publicizing creative product, and communication allows not only for greater breadth and depth of study, but also for tracking cultural change. Furthermore, the technological advances regarding research allow for collection and interpretation of data on a far grander scale and increased complexity of analysis. It is possible the future of creativity testing rests within computer software or an internet website. Moreover, how will we interpret genius and creative genius as computers grow in their capacity to accomplish basic tasks (and even, as in the case of IBM's Watson, win chess matches and construct original recipes; J. C. Kaufman, 2016b)?

We hope that such technology may unite disciplines that do not always communicate and interact. Creativity has been studied in many diverse fields, such as engineering, neuroscience, psychology, education, mathematics, computer science, anthropology, and the fine arts. However, discussions about creativity and collaboration between researchers across disciplines has remained startlingly and disturbingly rare. However, advances in technology—even something as simple as the continued growth of discipline-neutral Google Scholar and the blossoming ease of cross-nation collaboration—may encourage partnerships and cross-field study. J. C. Kaufman (2014) called those who are able to speak and engage in multiple fields and domains "scholarly bilingual." An increase in those who are scholarly bilingual, assisted by advances in technology and ease of communication will allow the field of creativity research to grow and be strengthened exponentially.

SUMMARY AND CONCLUSIONS

For a topic that can seem amorphous, mystical, or impossible to study, creativity has more than 65 years of active research and a surprisingly high level of agreement on fundamental issues. Unlike many topics, scholars, teachers, and students of creativity can apply their knowledge to their own lives and to enrich the lives of those near them. Creativity

has an array of benefits, from personal to professional to global, which are often assumed and not actively studied (Forgeard & Kaufman, 2016). A strong creativity advocate knows the facts about the topic, models creativity in her own life, and defends, enables, and nurtures creativity in the classroom and the world.

References

Aljughaiman, A., & Mowrer-Reynolds, E. (2005). Teachers' conceptions of creativity and creative students. *Journal of Creative Behavior*, *39*, 17–34. http://dx.doi.org/10.1002/j.2162-6057.2005.tb01247.x

Amabile, T. M. (1979). Effects of external evaluation on artistic creativity. *Journal of Personality and Social Psychology*, *37*, 221–233. http://dx.doi.org/10.1037/0022-3514.37.2.221

Amabile, T. M. (1996). *Creativity in context: Update to "The Social Psychology of Creativity."* Boulder, CO: Westview Press.

Avitia, M. J., & Kaufman, J. C. (2014). Beyond *g* and c: The relationship of rated creativity to long-term storage and retrieval (*Glr*). *Psychology of Aesthetics, Creativity, and the Arts*, *8*, 293–302. http://dx.doi.org/10.1037/a0036772

Barron, F. (1955). The disposition toward originality. *Journal of Abnormal and Social Psychology*, *51*, 478–485. http://dx.doi.org/10.1037/h0048073

Barron, F. (1963). *Creativity and psychological health*. Princeton, NJ: Van Nostrand.

Barron, K. E., & Harackiewicz, J. M. (2001). Achievement goals and optimal motivation: Testing multiple goal models. *Journal of Personality and Social Psychology*, *80*, 706–722. http://dx.doi.org/10.1037/0022-3514.80.5.706

Batey, M., Chamorro-Premuzic, T., & Furnham, A. (2009). Intelligence and personality as predictors of divergent thinking: The role of general, fluid and crystallised intelligence. *Thinking Skills and Creativity*, *4*, 60–69. http://dx.doi.org/10.1016/j.tsc.2009.01.002

Beghetto, R. A. (2005). Preservice teachers' self-judgments of test taking. *Journal of Educational Research*, *98*, 376–380. http://dx.doi.org/10.3200/JOER.98.6.376-380

Beghetto, R. A. (2007). Ideational code-switching: Walking the talk about supporting student creativity in the classroom. *Roeper Review*, *29*, 265–270. http://dx.doi.org/10.1080/02783190709554421

Beghetto, R. A. (2010). Intellectual hide-and-seek: Prospective teachers' prior experiences with creativity suppression. *International Journal of Creativity and Problem Solving*, *20*, 29–36.

Beghetto, R. A. (2013a). *Killing ideas softly? The promise and perils of creativity in the classroom*. Charlotte, NC: Information Age.

Beghetto, R. A. (2013b). Nurturing creativity in the micromoments of the classroom. In K. H. Kim, J. C. Kaufman, J. Baer, B. Sriramen, & L. Skidmore (Eds.), *Creatively gifted students are not like other gifted students: Research, theory, and practice* (pp. 3–15). http://dx.doi.org/10.1007/978-94-6209-149-8_2

Beghetto, R. A. (2014). Creative mortification: An initial exploration. *Psychology of Aesthetics, Creativity, and the Arts*, *8*, 266–276. http://dx.doi.org/10.1037/a0036618

Beghetto, R. A. (2016). Creative learning: A fresh look. *Journal of Cognitive Education and Psychology*, *15*, 6–23.

Beghetto, R. A., & Dilley, A. E. (2016). Creative aspirations or pipe dreams? Toward understanding creative mortification in children and adolescents. *New Directions for Child and Adolescent Development*, *2016*, 85–95. http://dx.doi.org/10.1002/cad.20150

Beghetto, R. A., & Kaufman, J. C. (2007). Toward a broader conception of creativity: A case for "mini-c" creativity. *Psychology of Aesthetics, Creativity, and the Arts*, *1*, 73–79. http://dx.doi.org/10.1037/1931-3896.1.2.73

Beghetto, R. A., & Kaufman, J. C. (2014). Classroom contexts for creativity. *High Ability Studies*, *25*, 53–69. http://dx.doi.org/10.1080/13598139.2014.905247

Beghetto, R. A., & Kaufman, J. C. (Eds.). (2016). *Nurturing creativity in the classroom* (2nd ed.). New York, NY: Cambridge University Press.

Beghetto, R. A., Kaufman, J. C., & Baer, J. (2014). *Teaching for creativity in the common core classroom*. New York, NY: Teachers College Press.

Boden, M. A. (2004). *The creative mind: Myths and mechanisms*. New York, NY: Psychology Press.

Cordova, D. I., & Lepper, M. R. (1996). Intrinsic motivation and the process of learning: Beneficial effects of contextualization, personalization, and choice. *Journal of Educational Psychology*, *88*, 715–730. http://dx.doi.org/10.1037/0022-0663.88.4.715

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York, NY: Harper & Row.

Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention*. New York, NY: HarperCollins.

Csikszentmihalyi, M. (1999). Implications of a systems perspective for the study of creativity. In R. J. Sternberg (Ed.), *Handbook of creativity* (pp. 313–335). Cambridge, England: Cambridge University Press.

Davies, D., Jindal-Snape, D., Collier, C., Digby, R., Hay, P., & Howe, A. (2013). Creative learning environments in education: A systematic literature review. *Thinking Skills and Creativity*, *8*, 80–91. http://dx.doi.org/10.1016/j.tsc.2012.07.004

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. http://dx.doi.org/10.1007/978-1-4899-2271-7

Deci, E. L., & Ryan, R. M. (2010). *Self-determination*. http://dx.doi.org/10.1002/9780470479216.corpsy0834

DeYoung, C. G. (2015). Cybernetic big five theory. *Journal of Research in Personality*, *56*, 33–58. http://dx.doi.org/10.1016/j.jrp.2014.07.004

Diakidoy, I. N., & Phtiaka, H. (2002). Teachers' beliefs about creativity. In S. P. Shohov (Ed.), *Advances in psychology research* (Vol. 15, pp. 173–188). Hauppauge, NY: Nova Science.

Diedrich, J., Benedek, M., Jauk, E., & Neubauer, A. C. (2015). Are creative ideas novel and useful? *Psychology of Aesthetics, Creativity, and the Arts*, *9*, 35–40. http://dx.doi.org/10.1037/a0038688

Dollinger, S. J., & Clancy, S. M. (1993). Identity, self, and personality: II. Glimpses through the autophotographic eye. *Journal of Personality and Social Psychology*, *64*, 1064–1071. http://dx.doi.org/10.1037/0022-3514.64.6.1064

Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist*, *41*, 1040–1048. http://dx.doi.org/10.1037/0003-066X.41.10.1040

Dweck, C. S. (2000). *Self-theories: Their role in motivation, personality and development*. Philadelphia, PA: Taylor & Francis.

Eisenberger, R., & Selbst, M. (1994). Does reward increase or decrease creativity? *Journal of Personality and Social Psychology*, *66*, 1116–1127. http://dx.doi.org/10.1037/0022-3514.66.6.1116

Eisenberger, R., & Shanock, L. (2003). Rewards, intrinsic motivation, and creativity: A case study of conceptual and methodological isolation. *Creativity Research Journal*, *15*, 121–130. http://dx.doi.org/10.1080/10400419.2003.9651404

Feist, G. J. (1998). A meta-analysis of personality in scientific and artistic creativity. *Personality and Social Psychology Review*, *2*, 290–309. http://dx.doi.org/10.1207/s15327957pspr0204_5

Flanagan, D. P., Ortiz, S. O., & Alfonso, V. C. (2013). *Essentials of cross-battery assessment* (3rd ed.). New York, NY: Wiley.

Florida, R. (2002). *The rise of the creative class and how it's transforming work, life, community and everyday life*. New York, NY: Basic Books.

Forgeard, M. J. C., & Kaufman, J. C. (2016). Who cares about imagination, creativity, and innovation, and why? A review. *Psychology of Aesthetics, Creativity, and the Arts*, *10*, 250–269. http://dx.doi.org/10.1037/aca0000042

Furnham, A., Zhang, J., & Chamorro-Premuzic, T. (2006). The relationship between psychometric and self-estimated intelligence, creativity, personality, and academic achievement. *Imagination, Cognition and Personality*, *25*, 119–145. http://dx.doi.org/10.2190/530V-3M9U-7UQ8-FMBG

Getzels, J. W., & Jackson, P. W. (1962). *Creativity and intelligence: Explorations with gifted students*. New York, NY: Wiley.

Gibson, C., & Mumford, M. D. (2013). Evaluation, criticism, and creativity: Criticism content and effects on creative problem solving. *Psychology of Aesthetics, Creativity, and the Arts*, *7*, 314–331. http://dx.doi.org/10.1037/a0032616

Glăveanu, V. P. (2013). Rewriting the language of creativity: The Five A's framework. *Review of General Psychology*, *17*, 69–81. http://dx.doi.org/10.1037/a0029528

Goldberg, L. R. (1992). The development of markers for the Big Five factor structure. *Psychological Assessment*, *4*, 26–42. http://dx.doi.org/10.1037/1040-3590.4.1.26

Guilford, J. P. (1950). Creativity. *American Psychologist*, *5*, 444–454. http://dx.doi.org/10.1037/h0063487

Hennessey, B. A. (2010). Intrinsic motivation and creativity in the classroom: Have we come full circle? In R. A. Beghetto & J. C. Kaufman (Eds.), *Nurturing creativity in the classroom* (pp. 329–361). http://dx.doi.org/10.1017/CBO9780511781629.017

Hennessey, B. A. (2015). Creative behavior, motivation, environment, and culture: The building of a systems model. *Journal of Creative Behavior*, *49*, 194–210. http://dx.doi.org/10.1002/jocb.97

Hennessey, B. A., & Amabile, T. M. (2010). Creativity. *Annual Review of Psychology*, *61*, 569–598. http://dx.doi.org/10.1146/annurev.psych.093008.100416

Hennessey, B. A., Amabile, T. M., & Martinage, M. (1989). Immunizing children against the negative effects of reward. *Contemporary Educational Psychology*, *14*, 212–227. http://dx.doi.org/10.1016/0361-476X(89)90011-8

Hennessey, B. A., & Zbikowski, S. (1993). Immunizing children against the negative effects of reward: A further examination of intrinsic motivation training techniques. *Creativity Research Journal*, *6*, 297–307. http://dx.doi.org/10.1080/10400419309534485

Hong, E., Peng, Y., & O'Neil, H. J., Jr. (2014). Activities and accomplishments in various domains: Relationships with creative personality and creative motivation in adolescence. *Roeper Review*, *36*, 92–103. http://dx.doi.org/10.1080/02783193.2014.884199

Horn, J. L., & Cattell, R. B. (1966). Refinement and test of the theory of fluid and crystallized general intelligences. *Journal of Educational Psychology*, *57*, 253–270. http://dx.doi.org/10.1037/h0023816

Ivcevic, Z., & Mayer, J. D. (2009). Mapping dimensions of creativity in the life-space. *Creativity Research Journal*, *21*, 152–165. http://dx.doi.org/10.1080/10400410902855259

Iyengar, S. S., & Lepper, M. R. (1999). Rethinking the value of choice: A cultural perspective on intrinsic motivation. *Journal of Personality and Social Psychology*, *76*, 349–366. http://dx.doi.org/10.1037/0022-3514.76.3.349

Jauk, E., Benedek, M., Dunst, B., & Neubauer, A. C. (2013). The relationship between intelligence and creativity: New support for the threshold hypothesis by means of empirical breakpoint detection. *Intelligence, 41*, 212–221. http://dx.doi.org/10.1016/j.intell.2013.03.003

Jauk, E., Benedek, M., & Neubauer, A. C. (2014). The road to creative achievement: A latent variable model of ability and personality predictors. *European Journal of Personality*, *28*, 95–105. http://dx.doi.org/10.1002/per.1941

Kaufman, J. C. (2014). Joining the conversation: A commentary on Glăveanu's critical reading. *Creativity: Theories-Research-Applications*, *1*, 220–222. http://dx.doi.org/10.15290/ctra.2014.01.02.07

Kaufman, J. C. (2016a). Creativity and mental illness: So many studies, so many wrong conclusions. In J. A. Plucker (Ed.), *Creativity and innovation: Theory, research, and practice* (pp. 199–204). Waco, TX: Prufrock Press.

Kaufman, J. C. (2016b). *Creativity 101* (2nd ed.). New York, NY: Springer.

Kaufman, J. C., & Beghetto, R. A. (2009). Beyond big and little: The Four C Model of Creativity. *Review of General Psychology*, *13*, 1–12. http://dx.doi.org/10.1037/a0013688

Kaufman, J. C., & Beghetto, R. A. (2013a). Do people recognize the Four Cs? Examining layperson conceptions of creativity. *Psychology of Aesthetics, Creativity, and the Arts*, *7*, 229–236. http://dx.doi.org/10.1037/a0033295

Kaufman, J. C., & Beghetto, R. A. (2013b). In praise of Clark Kent: Creative metacognition and the importance of teaching kids when (not) to be creative. *Roeper Review*, *35*, 155–165. http://dx.doi.org/10.1080/02783193.2013.799413

Kaufman, J. C., Beghetto, R. A., & Watson, C. (2016). Creative metacognition and self-ratings of creative performance: A 4-C perspective. *Learning and Individual Differences*, *51*, 394–399. http://dx.doi.org/10.1016/j.lindif.2015.05.004

Kaufman, J. C., Evans, M. L., & Baer, J. (2010). The American Idol effect: Are students good judges of their creativity across domains? *Empirical Studies of the Arts*, *28*, 3–17. http://dx.doi.org/10.2190/EM.28.1.b

Kaufman, S. B. (2013). Opening up openness to experience: A four-factor model and relations to creative achievement in the arts and sciences. *Journal of Creative Behavior*, *47*, 233–255. http://dx.doi.org/10.1002/jocb.33

Kim, K. H. (2005). Can only intelligent people be creative? A meta-analysis. *Journal of Secondary Gifted Education*, *16*, 57–66.

Kohn, A. (1993). *Punished by rewards*. Boston, MA: Houghton Mifflin.

Larson, L. M., Rottinghaus, P. J., & Borgen, F. H. (2002). Meta-analyses of Big Six interests and Big Five personality factors. *Journal of Vocational Behavior*, *61*, 217–239. http://dx.doi.org/10.1006/jvbe.2001.1854

Lepper, M. R., & Greene, D. (1975). Turning play into work: Effects of adult surveillance and extrinsic rewards on children's intrinsic motivation. *Journal of Personality and Social Psychology*, *31*, 479–486. http://dx.doi.org/10.1037/h0076484

Lepper, M. R., Greene, D., & Nisbett, R. E. (1973). Undermining children's intrinsic interest with extrinsic reward: A test of the "overjustification" hypothesis. *Journal of Personality and Social Psychology*, *28*, 129–137. http://dx.doi.org/10.1037/h0035519

Malik, M. A. R., Butt, A. N., & Choi, J. N. (2015). Rewards and employee creative performance: Moderating effects of creative self-efficacy, reward importance, and locus of control. *Journal of Organizational Behavior*, *36*, 59–74. http://dx.doi.org/10.1002/job.1943

Marland, S. (1972). *Education of the gifted and talented.* Report to the Congress of the United States by the U.S. Commissioner of Education. Washington, DC: Department of Health, Education and Welfare.

Martindale, C., & Dailey, A. (1996). Creativity, primary process cognition and personality. *Personality and Individual Differences*, *20*, 409–414. http://dx.doi.org/10.1016/0191-8869(95)00202-2

Midgley, C. (Ed.). (2014). *Goals, goal structures, and patterns of adaptive learning*. London, England: Routledge.

National Governors Association Center for Best Practices & Council of Chief State School Officers. (2015). *Common core state standards*. Washington, DC: Author.

Nusbaum, E. C., & Silvia, P. J. (2011). Are openness and intellect distinct aspects of openness to experience? A test of the O/I model. *Personality and Individual*

Differences, *51*, 571–574. http://dx.doi.org/10.1016/j.paid.2011.05.013

Plucker, J. A., Beghetto, R. A., & Dow, G. (2004). Why isn't creativity more important to educational psychologists? Potential, pitfalls, and future directions in creativity research. *Educational Psychologist*, *39*, 83–96. http://dx.doi.org/10.1207/s15326985ep3902_1

Preckel, F., Holling, H., & Wiese, M. (2006). Relationship of intelligence and creativity in gifted and nongifted students: An investigation of threshold theory. *Personality and Individual Differences*, *40*, 159–170. http://dx.doi.org/10.1016/j.paid.2005.06.022

Rhodes, M. (1962). An analysis of creativity. *Phi Delta Kappan*, *42*, 305–311.

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, *25*, 54–67. http://dx.doi.org/10.1006/ceps.1999.1020

Sánchez-Ruiz, M. J., Hernandez-Torrano, D., Perez-Gonzalez, J. C., Batey, M., & Petrides, K. V. (2011). The relationship between trait emotional intelligence and creativity across subject domains. *Motivation and Emotion*, *35*, 461–473. http://dx.doi.org/10.1007/s11031-011-9227-8

Silvia, P. J., & Beaty, R. E. (2012). Making creative metaphors: The importance of fluid intelligence for creative thought. *Intelligence*, *40*, 343–351. http://dx.doi.org/10.1016/j.intell.2012.02.005

Silvia, P. J., Beaty, R. E., & Nusbaum, E. C. (2013). Verbal fluency and creativity: General and specific contributions of broad retrieval ability (Gr) factors to divergent thinking. *Intelligence, 41*, 328–340. http://dx.doi.org/10.1016/j.intell.2013.05.004

Silvia, P. J., Kaufman, J. C., Reiter-Palmon, R., & Wigert, B. (2011). Cantankerous creativity: Honesty-humility, agreeableness, and the HEXACO structure of creative achievement. *Personality and Individual Differences*, *51*, 687–689. http://dx.doi.org/10.1016/j.paid.2011.06.011

Simonton, D. K. (2012). Taking the U.S. Patent Office creativity criteria seriously: A quantitative three-criterion definition and its implications. *Creativity Research Journal, 24*, 97–106.

Sternberg, R. J. (1999). A propulsion model of types of creative contributions. *Review of General Psychology*, *3*, 83–100. http://dx.doi.org/10.1037/1089-2680.3.2.83

Sternberg, R. J., & Kaufman, J. C. (2012). When your race is almost run, but you feel you're not yet done: Application of the propulsion theory of creative contributions to late-career challenges. *Journal of Creative Behavior*, *46*, 66–76. http://dx.doi.org/10.1002/jocb.005

Sternberg, R. J., Kaufman, J. C., & Pretz, J. E. (2001). The propulsion model of creative contributions applied to the arts and letters. *Journal of Creative Behavior*, *35*, 75–101. http://dx.doi.org/10.1002/j.2162-6057.2001.tb01223.x

Sternberg, R. J., Kaufman, J. C., & Pretz, J. E. (2002). *The creativity conundrum*. Philadelphia, PA: Psychology Press.

Sternberg, R. J., Kaufman, J. C., & Pretz, J. E. (2003). A propulsion model of creative leadership. *Leadership Quarterly*, *14*, 455–473. http://dx.doi.org/10.1016/S1048-9843(03)00047-X

Sternberg, R. J., & Lubart, T. I. (1995). *Defying the crowd*. New York, NY: Free Press.

To, M. L., Fisher, C. D., Ashkanasy, N. M., & Rowe, P. A. (2012). Within-person relationships between mood and creativity. *Journal of Applied Psychology*, *97*, 599–612. http://dx.doi.org/10.1037/a0026097

Westby, E. L., & Dawson, V. L. (1995). Creativity: Asset or burden in the classroom? *Creativity Research Journal*, *8*, 1–10. http://dx.doi.org/10.1207/s15326934crj0801_1

Wolfradt, U., & Pretz, J. E. (2001). Individual differences in creativity: Personality, story writing, and hobbies. *European Journal of Personality*, *15*, 297–310. http://dx.doi.org/10.1002/per.409