

Four Psychological Perspectives on Creativity

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Abstract

Creativity is a unique feature of human thinking and behavior that is essential to our species' survival, future progress, and even the rise and fall of civilizations. To understand this highly complex phenomenon, we need to adopt an interdisciplinary and multimethod approach. Because creativity happens at many different levels both intra- and interindividual, the psychological science of creativity currently lacks a strong paradigmatic coherence. In this essay, we review creativity research from four different scientific perspectives: cognitive, differential, developmental, and social, and attempt to provide a unified overarching picture. We present foundational and cutting-edge research addressing the following questions: (i) What cognitive processes are involved in creative thinking; (ii) What personality traits are characteristic of the creative person; (iii) What developmental factors lead to creative achievement; and (iv) What social factors foster creativity? We identify current debate issues and propose ways to promote unity and coherence in creativity research across psychological subfields. We offer a clear definition of creativity and identify promising theoretical models that could help integrate and direct future research.

INTRODUCTION

From our ancestors who survived and thrived in a hostile wilderness, to the atelier of an artist, to the laboratory of a scientist, to today's information technology giants, one key ingredient made it all possible, and that is, creativity. But what exactly *is* creativity?

Creativity is the process by which creative ideas are generated, selected, and successfully implemented. In order to count as creative, an idea must fulfill three criteria: *originality*, *usefulness*, and *surprise* (cf. Runco & Jaeger, 2012; Simonton, 2012b). To be original, an idea must be novel, unique, and it must have a low probability of being generated. To be useful, an idea should work and should solve a problem of interest, whether technological, scientific, or artistic (e.g., a poem that is so effective that it is frequently reprinted, quoted, and anthologized). To be surprising, an idea must be nonobvious; for

instance, if a solution were a simple derivation based on previous expertise, it might be considered original but not surprising. Each of these three criteria is necessary but not sufficient to render an idea creative. In addition, each of these criteria is quantitative rather than qualitative and has a zero point. Hence, the creativity of an idea can be conceptualized as the product of these three criteria. If an idea has zero originality, zero usefulness, or zero surprise, it can also be said to have zero creativity. The higher the level of each of the three criteria is, the more creativity. For example, in Kuhnian terms, “normal science” would probably be high in originality and usefulness, but relatively low in surprise, whereas “revolutionary science” would be high in all three criteria and thus, higher in creativity.

Further complicating the definition and measurement of creativity, there are different levels of magnitude: “little-c” versus “Big-C” creativity (Kaufman & Beghetto, 2009). Both types of creativity must satisfy all three criteria mentioned earlier. However, for “little-c” creativity, the levels of originality, usefulness, and surprise are determined subjectively, and thus are personal. This level is also called “everyday creativity” that yields the creative ideas that happen daily at home and the workplace. These ideas will be creative with respect to the individual but not with respect to the world at large. At the other extreme is “Big-C Creativity,” where originality, usefulness, and surprise are assessed by others with relevant expertise in the domain, such as colleagues. These creative ideas will be creative not only with respect to the individual but also with respect to the larger world. Although “little-c” and “Big-C” creativity are believed to share common cognitive processes that allow for the production of creative ideas, there are also some qualitative differences. Naturally, not everyone who is capable of little-c creativity is also capable of Big-C creativity. The latter requires much more than just creative thinking (i.e., the ability to generate creative ideas); it requires motivation and expertise (Amabile, 1996), as well as the right *Zeitgeist*, or “being the right person, in the right place, at the right time” (Simonton, 2004). One complex problem is how little-c precisely dovetails with Big-C creativity. Although some researchers have just assumed that when little-c becomes high enough it becomes recognized as Big-C creativity, the reality may be much more complex than that.

Another issue that complicates the study of creativity is the multiple levels of analysis and perspectives that may be adopted (Hennessey & Amabile, 2010). What are the cognitive processes underlying creativity? Who is the creative person, what are their personality characteristics? What developmental aspects contribute to creative thinking and achievement? What aspects of our social world foster creativity? Unfortunately, each of these questions is confined to one subdiscipline of psychology: cognitive, differential, developmental, and social. The challenge in studying creativity is to operate at the

intersection of these different levels of analysis and to adopt an interdisciplinary approach. In the next pages, we give a brief overview of how each of these subfields of psychology conceptualizes creativity, and how scientists have attempted to bridge these different areas of research. We believe that an integrative and interdisciplinary approach is essential to understanding the highly complex phenomenon of human creativity. We hope this will stimulate more high-quality research on creativity, as this is one of the most sought after modern skills. As President Obama put it, “the first next step in winning the future is encouraging innovation.” Whoever masters the science of innovation and creativity will undoubtedly master the world economy in the years to come.

FOUNDATIONAL RESEARCH

COGNITIVE PSYCHOLOGY OF CREATIVITY

Cognitive psychologists have long been interested in creative thinking, that is, the cognitive processes that lead to creative ideas (Simonton & Damian, 2013). As mentioned earlier, creative ideas must be original and surprising; this implies that memories or past experiences would not be most useful in generating such ideas. How does one generate new ideas that have a low probability of occurrence? Many researchers have suggested that a “broad attention focus,” “defocused attention,” “cognitive disinhibition,” or “reduced latent inhibition” must be the answer (Carson, 2014). Regardless of which term we use, all of these attentional styles have one thing in common: They expand the scope of attention, allowing for a larger pool of stimuli and thoughts to be “scanned” and integrated as “potentially relevant” to the problem at hand. Thus, a broad attention focus and a low latent inhibition help people “think outside the box” because they are less likely to “filter out” valuable information based on their *a priori* rules of what information is relevant. Social cognitive psychologists support this view, showing that creative thinking and decision making are harmed by an excessive use of rule-based thinking, as opposed to a more intuitive broad thinking (Damian & Sherman, 2013). A downside to reduced latent inhibition is its association with psychopathology (Carson, 2014). The psychotic mind is constantly bombarded by stimuli and associations that should be filtered out to begin with.

DIFFERENTIAL PSYCHOLOGY OF CREATIVITY

Differential psychologists investigate the individual differences related to creativity, that is, the creative person. These differences can be (i) cognitive, such as general intelligence and special mental abilities or (ii) dispositional,

such as personality, motivation, and values. Individual differences can often explain inconsistencies in findings at the level of basic cognitive processes, so they are essential for understanding creativity. For example, the finding that reduced latent inhibition can have both positive and negative outcomes, namely, creativity and psychopathology, respectively, can be explained by individual differences in general intelligence (Carson, 2014). People with exceptional intelligence have sufficient metacognitive skills and abilities to take advantage of the relatively unfiltered inflow of information and come up with creative ideas, whereas those with lower intelligence become overwhelmed by that sensory and associative influx, thus being more likely to become mentally ill. Note however, that general intelligence ceases to have a strong correlation with creativity in the upper levels of tested intelligence (Simonton, 2004). This declining predictive effectiveness implies that other factors are involved, such as personality traits. We now know that creative persons have a distinctive profile of personality traits. For instance, creativity is highly correlated with openness to experience (as defined in the 5-factor model of personality; McCrae & Greenberg, 2014), a personality dimension that also correlates with reduced latent inhibition (Carson, 2014). Moreover, the personality traits of creative people vary by domain of achievement. For example, creative artists are more inclined toward psychopathology than creative scientists (Simonton, 2014).

DEVELOPMENTAL PSYCHOLOGY OF CREATIVITY

Developmental psychologists investigate how creativity changes across the life span. What are the environmental factors that contribute to the development of creative potential, and how does creativity change with maturity and old age? Regarding the first question, early work focused on family background and educational experiences: Highly creative people are more likely to come from professional families and to be well educated; good school performance is not necessarily characteristic, but an early passion for a subject and self-directed effort is (Simonton, 2004). Regarding the second question, researchers have studied how creative productivity and (i.e., output) changes during the course of an artistic or scientific career, as well as key landmarks; generally, the first big contribution comes after 10 years of operating in a specific domain, and the best contribution occurs during the time that is also most productive, between 35 and 45 years of age; there are, however, some exceptions, depending on the domain of achievement and the time when the individual started accumulating expertise in that specific domain (Simonton, 1997). Although previous research documented a decrement in creativity with age (Simonton, 2012a), recent findings suggest a reduction in this trend,

at least in the sciences, which may be due to the increasing impact of collaborative activity (Stroebe, 2010).

SOCIAL PSYCHOLOGY OF CREATIVITY

Social psychologists investigate creativity in its social context, at three different levels: interpersonal, group, and sociocultural. At the interpersonal level, researchers have shown that external evaluation can hinder creativity, especially if rewards or praise are emphasized, as opposed to mere enjoyment (Hennessey & Amabile, 2010). At the group level, scientists have shown that, despite wide-spread practices in the business world, brainstorming in large (verbally) interactive groups produces fewer and worse ideas than the same number of individuals working alone, and this effect is mostly due to production blocking (i.e., not everyone has a chance to present their ideas because of “bottle-necking” when taking turns to speak, which results in forgetting ideas). However, group brainstorming may be effective when groups are small, when participants can write down their own ideas at any time and have access to the growing pool of shared ideas, and when they are encouraged to break down the problem in smaller chunks and focus on producing original ideas (for a review, see Stroebe, Nijstad, & Rietzschel, 2010). Furthermore, group creativity increases significantly when group membership is highly diverse, owing to the increased heterogeneity of perspectives and ideas (Nemeth & Nemeth-Brown, 2003). Membership diversity can entail gender, ethnicity, training, age, and a host of other demographic and occupational factors. At the sociocultural level, there is evidence that migration increases creative achievement at the national level, probably due to increased diversity (Simonton, 2003).

More recently, creativity has also emerged as a topic of social cognition, thus, integrating cognitive and social perspectives. We now know that a broad attention focus and the ensuing creative cognitive style (thinking flexibly and making remote associations) can be triggered by a positive (as opposed to a negative mood), a promotion (as opposed to a prevention) regulatory focus, an approach (as opposed on avoidance) motivation, and by social power (Baas, De Dreu, & Nijstad, 2008; Friedman & Foerster, 2001; Galinsky, Gruenfeld, Magee, Whitson, & Liljenquist, 2008). However, when noting these effects, one must keep in mind that there are many paths to creativity; although a broad attention focus and its antecedents can improve idea generation, this is not the only way to enhance creative achievement. Negative moods, a prevention focus, an avoidance motivation, and less social power have their benefits too; they enhance vigilance and attention to detail, they increase persistence, and thus, make people more likely to finish a task they started (Roskes, DeDreu, Nijstad, 2012). Perhaps the

ideal would be to flexibly change moods and motivation depending on the problem solving stage. For instance, one should be in a positive mood while brainstorming an idea and plot for a new novel, but one should be in a negative mood while actually writing the novel, given that persistence and attention to detail are essential for a good writing style. This is an open question for future research, but it seems promising given that this social cognitive model of creativity would certainly explain the high incidence of bipolar disorders among creative writers.

CUTTING-EDGE RESEARCH

COGNITIVE PSYCHOLOGY OF CREATIVITY

Hoping to identify the cognitive processes and neural bases for creativity, psychologists have started investigating creative thinking using the latest neuroscientific techniques, such as electroencephalograms (EEGs), event-related potentials (ERPs), and magnetic resonance imaging (MRI). However, two extensive reviews of over 60 studies concluded that no specific brain region is consistently related to creativity, and that creative thinking is not lateralized to the right hemisphere, as it is commonly believed (Dietrich & Kanso, 2010; Sawyer, 2011). The empirical inconsistencies are partly due to divergent definitions and measures of creativity, and partly due to the complexity and diversity of the creative process itself. Even across these two extensive reviews, there are major differences in conclusions. Although Dietrich and Kanso (2010) conclude that there is no consistent evidence that defocused attention is related to creative thinking, Sawyer (2011) maintains that mind wandering and intuitive thinking (unconstrained by conscious rule-based thinking) are related to creativity. Furthermore, and not surprisingly, imaging studies confirm that expertise is relevant for domain-specific creativity.

Although domain-specific creativity certainly depends on expertise, some researchers have gone so far as to argue that creativity is entirely domain specific (Simonton, 2007). As a consequence, not only will artistic creativity differ from scientific creativity but also creativity will differ across various artistic or scientific domains. However, Simonton (2011) has recently argued that creativity in all domains is necessarily contingent on blind variation and selective retention (BVSR). Put simply, BVSR creativity encompasses a set of processes and procedures that all share one characteristic, namely, the capacity to consider original ideas without knowing in advance whether or not they will prove useful. The BVSR theory of creativity has been developed using empirical analyses, case studies, and mathematical models (e.g., Damian &

Simonton, 2011; Simonton, 2013). This theory also has been directly linked with cutting-edge research in the next three areas.

DIFFERENTIAL PSYCHOLOGY OF CREATIVITY

Although scientists have examined most personality traits and their relation to creativity, affective traits have been largely overlooked. In particular, trait tendencies toward certain self-conscious emotions, such as pride and shame, are especially important for creative achievement because they play a central role in motivating and regulating behavior. These emotions drive people to work hard in achievement contexts and to behave in moral, socially appropriate ways in their social interactions and relationships. Pride, in particular, is the most closely linked to achievement. When people master a challenging task or accomplish something of societal value, they not only feel good, they feel good about themselves. This sense of pride engenders feelings of competence and promotes social status.

Recent research found that trait pride relates to creative thinking and creative achievement, but that it matters which specific type of pride people are predisposed to experience. There are two conceptually and empirically distinct forms of pride: *authentic pride* ("I won because I worked hard") and *hubristic pride* ("I won because I am a genius"). These two forms have different outcomes. People higher in authentic pride showed more creative thinking and more creative achievement; they composed more music, sold more artwork, and won more science awards. This relation was mediated by higher intrinsic motivation (i.e., achieving for its own sake), suggesting that individuals higher in authentic pride enjoy their work more and consequently produce more creative achievements. In contrast to authentic pride, hubristic pride was related to less creative thinking, was unrelated to creative achievement, and was associated with less intrinsic and more extrinsic motivation (i.e., achieving for external rewards) (Damian & Robins, 2012; Damian & Robins, 2013).

DEVELOPMENTAL PSYCHOLOGY OF CREATIVITY

New studies in this area point to multiculturalism as an important predictor of creativity (Leung, Maddux, Galinsky, & Chiu, 2008). Multicultural experiences enhance the ability to think flexibly and creatively, but these effects are often moderated by openness to experience (Leung & Chiu, 2008) and bicultural identity integration (i.e., the extent to which people perceive their diverse cultural identities as blended and in harmony; Saad, Damian, Benet-Martinez, Moons, & Robins, 2013). This developmental effect may also relate to the empirical finding that functional bilingualism

is correlated with creativity (Simonton, 2008). A person who easily encodes any given thought or image in two distinct languages will likely display more cognitive flexibility. This also echoes the finding that group diversity and national migration increase creativity, as described earlier. The question remains: Is there something special about multicultural experiences, or does experience with any type of “diversity,” enhance creativity? Diversity comes in many forms: Multiculturalism, mental illness, early parental loss, economic instability, physical disability, racial discrimination, and religious minority are but a few. Can these experiences also enhance creativity?

Recent research proposes that these life experiences can be conceptualized as *diversifying experiences*—unusual and unexpected events or situations. Regardless of their affective valence, all of these experiences push individuals outside the realm of “normality,” and violate their existing schemas, thus teaching them to “think outside the box.” Indeed, when conducting a historical analysis of eminent African Americans, researchers found that diversifying experiences during childhood (including all of the above-mentioned experiences) predicted creative eminence in adulthood (Damian & Simonton, 2014).

SOCIAL PSYCHOLOGY OF CREATIVITY

Bridging these findings in the developmental area with a social cognitive approach, researchers asked: Could there be a basic cognitive mechanism by which diversifying experiences enhance cognitive flexibility and hence creative thinking? In one experiment, participants experienced complex unusual and unexpected events happening in a virtual reality. In a second experiment, participants were confronted with basic schema-violations (such as preparing breakfast in the “wrong” order). In both experiments, a diversifying experience—defined as active (but not vicarious) involvement in an unusual event—increased cognitive flexibility more than active (or vicarious) involvement in normal experiences. These experiments were the first to provide evidence for a causal link between diversifying experiences and creative thinking, and to suggest a cognitive mechanism underlying this effect, namely an active schema-violation, that is, the personally experienced violation of expectations (Ritter *et al.*, 2012). In line with these findings, a new study (Vohs, Redden, & Rahinel, 2013) showed that a disorderly environment (which is a type of schema-violation) promotes creativity.

Besides these advances in the social cognition of creativity, the social psychology of group level creativity has also seen a recent boom, especially in organizational contexts. In a longitudinal study, Amabile and Kramer (2011) coded the daily diaries of employees from creative research teams at several

major international companies. The employees were most creative and efficient when they could feel a sense of progress and enjoyment, and the latter predicted company performance.

KEY ISSUES FOR FUTURE RESEARCH

The major issue in this area of research is defining creativity. As evidenced earlier, creativity is a multidimensional and interdisciplinary topic of study. There are different types of creativity (domain general vs domain specific), different magnitudes (little-c vs Big-C; personal vs universal), and different levels of analysis (process, person, product). Researchers focusing on each of these different facets have adopted their own definitions and measures of creativity, sometimes indiscriminately labeling all of them just “creativity measures,” when in fact the various measures capture highly distinct facets of creativity. This practice has resulted over the years in many contradictory findings and arduous debates, some of which I present here. In search of a more paradigmatic and unified science of creativity, researchers should first and foremost strive to resolve definitional issues. Researchers in all subfields of psychology should clearly specify what type of creativity they are measuring and which exact aspects of the process, as opposed to just saying, “we measured creativity.” This simple practice, which can be easily achieved by consulting this essay or the recent literature reviews and meta-analyses cited in this essay, could prevent misunderstandings and general distrust in creativity research.

For example, social psychologists have debated for 20 years whether positive or negative moods foster creativity. Thanks to the meta-analysis by Baas and colleagues (2008), we now know the conflicting results were due to the use of different measures of creativity. Positive moods result in increased cognitive flexibility (i.e., and increase in the variety of the ideas generated), which is a blind variation (BV) process, whereas negative moods result in increased within-category fluency (i.e., perseverance in pursuing one idea category) and better attention to detail, which seems to be more akin to a selective retention (SR) type of process. Thus, past results were not conflicting, they were simply indicating effects of mood on the different stages of the creative process. If one were to write a new novel, a positive mood would be required to come up with an original idea, but a negative mood would be more helpful when sitting at the desk long hours to actually write it and proofread it. This finding now raises a very interesting theoretical question: Is a “state view” appropriate for explaining the influence of mood on creativity, or do we need to adopt a “dynamic view,” where it is the *change* in mood that results in creativity, not each mood itself?

Another example of a debate resulting from definitional issues comes from the motivation literature: Does intrinsic or extrinsic motivation promote creativity? Initial studies suggested the former, but later studies challenged that idea (for a review, see Hennessey & Amabile, 2010). Again, it turned out that the two lines of research were targeting different types of creativity: Intrinsic motivation was beneficial for creativity tasks requiring high levels of BV, whereas extrinsic motivation was beneficial for creativity tasks requiring high levels of SR and attention to detail and following rules.

Differential psychologists have also long been puzzled at the variety of personality traits characteristic of creative geniuses. On the one hand, they are open to new experiences, interesting to be around, and full of energy and enthusiasm, but on the other hand, they are hard working, introverted, and even slightly disagreeable. If we assumed creativity was a unifaceted process, this plethora of traits would be highly confusing; however, knowing the many types of cognitive processes involved in creativity, we can easily explain why this combination of personality traits is so prevalent among highly creative people. The first set of traits are likely conducive to improved BV, whereas the second set of traits are likely conducive to improved SR.

Because creativity has different facets and levels, one challenge faced by future researchers is to adopt an interdisciplinary multimethod approach. When one identifies a phenomenon related to creativity, one must ask: Which type of creativity did I measure? Would this apply to other aspects and levels? Explicitly addressing these questions is preferable to merely generalizing the results to the indistinct and flashy word that is “creativity.”

Another important problem faced by creativity researchers is that we do not yet know if and how phenomena observed at the little-c level in the laboratory generalize to Big-C creativity. One way to solve this problem is to conduct more high-quality longitudinal studies, where real-world creativity is assessed. Using advanced statistical techniques, such as structural equation modeling, hierarchical linear modeling, and propensity score matching, longitudinal studies can address issues of causality, ecological validity, and the development of Big-C creativity. Unfortunately, high-quality longitudinal studies are very time consuming and expensive. One great example of such a longitudinal study is the Study of Mathematically Precocious Youth and their later achievements (Kell & Lubinski, 2014).

In addition to high-quality longitudinal studies, recent technological advances may also benefit creativity research. We reviewed earlier the study by Ritter and colleagues (2012) using virtual reality to simulate real-world diversifying experiences; moreover, researchers have increasingly started collecting data with the help of fMRI, iPhone apps, online databases, and language analysis programs.

We hope that our brief but broad review has convinced the reader that creativity is an important topic of research, highly relevant to a variety of fields besides psychology, such as education, business, sociology, and economics, and that is best studied taking an interdisciplinary multimethod approach.

REFERENCES

- Amabile, T. M. (1996). *Creativity in context: Update to the social psychology of creativity*. Boulder, CO: Westview.
- Amabile, T., & Kramer, S. (2011). *The progress principle: Using small wins to ignite joy, engagement, and creativity at work*. Boston, MA: Harvard Business Review Press.
- Baas, M., De Dreu, C. K. W., & Nijstad, B. A. (2008). A meta-analysis of 25 years of mood-creativity research: Hedonic tone, activation, or regulatory focus? *Psychological Bulletin*, *134*, 779–806.
- Carson, S. (2014). Cognitive disinhibition, creativity, and psychopathology. In D. K. Simonton (Ed.), *The Wiley handbook of genius* (pp. 198–221). Oxford, England: Wiley-Blackwell.
- Damian, R. I., & Robins, R. W. (2012). The link between dispositional pride and creative thinking depends on current mood. *Journal of Research in Personality*, *46*, 765–769.
- Damian, R. I., & Robins, R. W. (2013). Aristotle's virtue or Dante's deadliest sin? The pride-creativity link and the mediating role of motivation. *Learning and Individual Differences*, *26*, 156–160.
- Damian, R. I., & Sherman, J. W. (2013). A process dissociation examination of cognitive processes underlying unconscious thought. *Journal of Experimental Social Psychology*, *49*, 228–237.
- Damian, R. I., & Simonton, D. K. (2014). Psychopathology, adversity, and creativity: Diversifying experiences in the development of eminent African-Americans. *Journal of Personality and Social Psychology*, doi:10.1037/pspi0000011
- Damian, R. I., & Simonton, D. K. (2011). From past to future art: The creative impact of Picasso's 1935 Minotauremarchy on his 1937 Guernica. *Psychology of Aesthetics, Creativity, and the Arts*, *5*, 360–369.
- Dietrich, A., & Kanso, R. (2010). A review of EEG, ERP, and neuroimaging studies of creativity and insight. *Psychological Bulletin*, *136*, 822–848.
- Friedman, R., & Förster, J. (2001). The effects of promotion and prevention cues on creativity. *Journal of Personality and Social Psychology*, *81*, 1001–1013.
- Galinsky, A., Gruenfeld, D., Magee, J., Whitson, J., & Liljenquist, K. (2008). Power reduces the press of the situation: Implications for creativity, conformity and dissonance. *Journal of Personality and Social Psychology*, *95*, 1450–1466.
- Hennessey, B. A., & Amabile, T. M. (2010). Creativity. *Annual Review of Psychology*, *61*, 569–598.
- Kaufman, J. C., & Beghetto, R. A. (2009). Beyond big and little: The four c model of creativity. *Review of General Psychology*, *13*, 1–13.
- Kell, H. J., & Lubinski, D. (2014). The study of mathematically precocious youth at maturity: Insights into elements of genius. In D. K. Simonton (Ed.),

- The Wiley-Blackwell handbook of genius* (pp. 397–421). Oxford, England: Wiley-Blackwell.
- Leung, A., & Chiu, C. (2008). Interactive effects of multicultural experiences and openness to experience on creative potential. *Creativity Research Journal*, *20*, 376–382.
- Leung, A. K., Maddux, W. W., Galinsky, A. D., & Chiu, C. (2008). Multicultural experience enhances creativity: The when and how. *American Psychologist*, *63*, 169–181.
- McCrae, R. R., & Greenberg, D. M. (2014). Openness to experience. In D. K. Simonton (Ed.), *The Wiley-Blackwell handbook of genius* (pp. 222–243). Oxford, England: Wiley-Blackwell.
- Nemeth, C. J., & Nemeth-Brown, B. (2003). Better than individuals? The potential benefits of dissent and diversity. In P. B. Paulus & B. A. Nijstad (Eds.), *Group creativity: Innovation through collaboration* (pp. 63–84). New York, NY: Oxford University Press.
- Ritter, S. M., Damian, R. I., Simonton, D. K., van Baaren, R., Strick, M., Derks, J., & Dijksterhuis, A. (2012). Diversifying experiences enhance cognitive flexibility. *Journal of Experimental Social Psychology*, *48*, 961–964.
- Roskes, M., de Dreu, C., & Nijstad, B. (2012). Necessity is the mother of invention: Avoidance motivation stimulates creativity through cognitive effort. *Journal of Personality and Social Psychology*, *103*(2), 242–256.
- Runco, M., & Jaeger, G. J. (2012). The standard definition of creativity. *Creativity Research Journal*, *24*, 92–96.
- Saad, C. S., Damian, R. I., Benet-Martinez, V., Moons, W. G., & Robins, R. W. (2013). Multiculturalism and creativity: Effects of cultural context, bicultural identity, and cognitive fluency. *Social Psychological and Personality Science*, *4*, 369–375. doi:10.1177/1948550612456560
- Sawyer, R. K. (2011). The cognitive neuroscience of creativity: A critical review. *Creativity Research Journal*, *23*, 137–154.
- Simonton, D. K. (1997). Creative productivity: A predictive and explanatory model of career trajectories and landmarks. *Psychological Review*, *104*, 66–89.
- Simonton, D. K. (2003). Creative cultures, nations, and civilizations: Strategies and results. In P. B. Paulus & B. A. Nijstad (Eds.), *Group creativity: Innovation through collaboration* (pp. 304–328). New York, NY: Oxford University Press.
- Simonton, D. K. (2004). *Creativity in science: Chance, logic, genius, and zeitgeist*. Cambridge, England: Cambridge University Press.
- Simonton, D. K. (2007). Creativity: Specialized expertise or general cognitive processes?. In M. J. Roberts (Ed.), *Integrating the mind: Domain general versus domain specific processes in higher cognition* (pp. 351–367). Hove, England: Psychology Press.
- Simonton, D. K. (2008). Bilingualism and creativity. In J. Altarriba & R. R. Heredia (Eds.), *An introduction to bilingualism: Principles and processes* (pp. 147–166). Mahwah, NJ: Erlbaum.
- Simonton, D. K. (2011). Creativity and discovery as blind variation: Campbell's (1960) BVSR model after the half-century mark. *Review of General Psychology*, *15*, 158–174.

- Simonton, D. K. (2012a). Creative productivity and aging: An age decrement – or not?. In S. K. Whitbourne & M. Sliwinski (Eds.), *The Wiley-Blackwell handbook of adult development and aging* (pp. 477–496). New York, NJ: Wiley-Blackwell.
- Simonton, D. K. (2012b). Taking the US Patent Office creativity criteria seriously: A quantitative three-criterion definition and its implications. *Creativity Research Journal*, 24, 97–106.
- Simonton, D. K. (2013). Creative thought as blind variation and selective retention: Why sightedness is inversely related to creativity. *Journal of Theoretical and Philosophical Psychology*, 33, 253–266.
- Simonton, D. K. (2014). More method in the mad-genius controversy: A historiometric study of 204 historic creators. *Psychology of Aesthetics, Creativity, and the Arts*, 8, 53–61.
- Simonton, D. K., & Damian, R. I. (2013). Creativity. In D. Reisberg (Ed.), *Oxford handbook of cognitive psychology* (pp. 795–807). New York, NY: Oxford University Press.
- Stroebe, W. (2010). The graying of academia: Will it reduce scientific productivity? *American Psychologist*, 65, 660–673.
- Stroebe, W., Nijstad, B. A., & Rietzschel, E. F. (2010). Beyond productivity loss in brainstorming groups: The evolution of a question. *Advances in Experimental Social Psychology*, 43, 157–203.
- Vohs, K. D., Redden, J. P., & Rahinel, R. (2013). Physical order produces healthy choices, generosity, and conventionality, whereas disorder produces creativity. *Psychological science*, 24(9), 1860–1867.

FURTHER READING

- Hennessey, B. A., & Amabile, T. M. (2010). Creativity. *Annual Review of Psychology*, 61, 569–598.
- Kaufman, J. C., & Sternberg, R. J. (Eds.) (2009). *Cambridge handbook of creativity*. New York, NY: Cambridge University Press.
- Sawyer, R. K. (2011). *Explaining creativity: The science of human innovation* (2nd ed.). New York, NY: Oxford University Press.

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Dean Keith Simonton (PhD 1975 Harvard University) is Distinguished Professor of Psychology at the University of California, Davis. His bibliography lists more than 470 publications, including a dozen books. Among the latter are *Genius, Creativity, and Leadership*; *Scientific Genius*; *Greatness*; *Genius and Creativity*; *Origins of Genius*; *Great Psychologists and Their Times*; *Creativity in Science*; *Genius 101*; and *Great Flicks*. Simonton received the William James Book Award, Sir Francis Galton Award for Outstanding Contributions to the Study of Creativity, the Rudolf Arnheim Award for Outstanding Achievement in Psychology and the Arts, the Theoretical Innovation Prize in Personality and Social Psychology, the George A. Miller Outstanding Article Award, the E. Paul Torrance and President's Awards from the National Association for Gifted Children, and the Robert S. Daniel Award for Four-Year College/University Teaching. He is Fellow of several professional organizations, including the American Association for the Advancement of Science, the American Psychological Society, and ten divisions of the American Psychological Association (APA). He has served as President of the International Association of Empirical Aesthetics, the Society for the Psychology of Aesthetics, Creativity and the Arts (APA, Division 10), and the Society for General Psychology (APA, Division 1).

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