3.3: Creativity

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An idea or solution is considered creative if it is original, useful, and surprising. However, depending on who actually judges these three criteria, we must distinguish personal “little-c creativity” from consensual “Big-C Creativity.” In any case, psychologists who investigate creativity most often adopt one of three perspectives. First, they can ask how creators think, and thus focus on the cognitive processes behind creativity. Second, they can ask who is creative, and hence investigate the personal characteristics of highly creative people. Third, they can ask about the social context, and, thereby, examine the environments that influence creativity.

Although psychologists have made major advances in the study of creativity, many exciting and important questions remain to be answered.

learning objectives

- Comprehend the three criteria that have to be satisfied to conclude that an idea is creative.
- Appreciate some of the cognitive processes that provide the basis for creativity.
- Know some of the personal characteristics of highly creative people.
- Understand how certain social environments influence creativity.

What do the following have in common: the drug penicillin, the Eiffel Tower, the film Lord of the Rings, the General Theory of Relativity, the hymn Amazing Grace, the iPhone, the novel Don Quixote, the painting The Mona Lisa, a recipe for chocolate fudge, the soft drink Coca-Cola, the video game Wii Sports, the West Coast offense in football, and the zipper? You guessed right! All of the named items were products of the creative mind. Not one of them existed until somebody came up with the idea. Creativity is not something that you just pick like apples from a tree. Because creative
ideas are so special, creators who come up with the best ideas are often highly rewarded with fame, fortune, or both. Nobel Prizes, Oscars, Pulitzers, and other honors bring fame, and big sales and box office bring fortune. Yet what is creativity in the first place?

The original patent drawings for the "clasp locker" - what we today call a zipper. This ubiquitous device was the product of the creative mind of American inventor Whitcomb Judson, who also invented a machine to make zippers quickly and cheaply. [Image: CC0 Public Domain, https://goo.gl/m25gce]

Creativity: What Is It?

Creativity happens when someone comes up with a creative idea. An example would be a creative solution to a difficult problem. But what makes an idea or solution creative? Although psychologists have offered several definitions (Plucker, Beghetto, & Dow, 2004; Runco & Jaeger, 2012), probably the best definition is the one recently adapted from the three criteria that the U.S. Patent Office uses to decide whether an invention can receive patent protection (Simonton, 2012).
Knowing that magnifying glasses were already widely known, how would you judge the creativity of the invention of eyeglasses using the criteria of originality, usefulness, and surprise? [Image: CC0 Public Domain, https://goo.gl/m25gce]

The first criterion is **originality**. The idea must have a low probability. Indeed, it often should be unique. Albert Einstein’s special theory of relativity certainly satisfied this criterion. No other scientist came up with the idea.

The second criterion is **usefulness**. The idea should be valuable or work. For example, a solution must, in fact, solve the problem. An original recipe that produces a dish that tastes too terrible to eat cannot be creative. In the case of Einstein’s theory, his relativity principle provided explanations for what otherwise would be inexplicable empirical results.

The third and last criterion is **surprise**. The idea should be surprising, or at least nonobvious (to use the term used by the Patent Office). For instance, a solution that is a straightforward derivation from acquired expertise cannot be considered surprising even if it were original. Einstein’s relativity theory was not a step-by-step deduction from classical physics but rather the theory was built upon a new foundation that challenged the very basis of traditional physics.

When applying these three criteria, it is critical to recognize that originality, usefulness, and surprise are all quantitative rather than qualitative attributes of an idea. Specifically, we really have to speak of degree to which an idea satisfies each of the three criteria. In addition, the three attributes should have a zero point, that is, it should be possible to speak of an idea lacking any originality, usefulness, or surprise whatsoever. Finally, we have to assume that if an idea scores zero on any one criterion then it must have zero creativity as well. For example, someone who reinvents the wheel is definitely producing a useful idea, but the idea has zero originality and hence no creativity whatsoever. Similarly, someone who invented a parachute made entirely out of steel reinforced concrete would get lots of credit for originality—and surprise!—but none for usefulness.

Yet, certainly, we have to ask: Who makes these judgments? The person who generated the idea or other people who the person expects to appreciate the idea? If the former, we can speak of subjective or personal “little-c creativity,” and
if the later, we have objective or consensual "Big-C Creativity" (Simonton, in press). This distinction is important because sometimes personal and consensual assessments do not have to agree. Such disagreements are especially conspicuous in "neglected geniuses," such as the poet Emily Dickinson, the painter Vincent Van Gogh, and the scientist Gregor Mendel—all producing ideas that received only posthumous recognition for their creativity.

Creativity is a very complex phenomenon (Hennessey & Amabile, 2010; Runco, 2004). As a result, psychologists who study creativity can do so from many different perspectives. Nevertheless, the three most common perspectives are cognitive processes, personal characteristics, and social contexts.

### Cognitive Processes: How Do Creators Think?

Cognitive scientists have long been interested in the thinking processes that lead to creative ideas (Simonton & Damian, 2013). Indeed, many so-called “creativity tests” are actually measures of the thought processes believed to underlie the creative act (Simonton, 2003b). The following two measures are among the best known.

The first is the Remote Associates Test, or RAT, that was introduced by Mednick (1962). Mednick believed that the creative process requires the ability to associate ideas that are considered very far apart conceptually. The RAT consists of items that require the respondent to identify a word that can be associated to three rather distinct stimulus words. For example, what word can be associated with the words “widow, bite, monkey”? The answer is spider (black widow spider, spider bite, spider monkey). This particular question is relatively easy, others are much more difficult, but it gives you the basic idea.

What do you see? An ordinary piece of building material? Those who score higher on the Unusual Uses Task are able to imagine many possibilities for the humble brick. [Image: CC0 Public Domain, https://goo.gl/m25gce]

The second measure is the Unusual Uses Task (Guilford, 1967; Torrance, 1974). Here, the participant is asked to generate alternative uses for a common object, such as a brick. The responses can be scored on four dimensions: (a)
fluency, the total number of appropriate uses generated; (b) originality, the statistical rarity of the uses given; (c) flexibility, the number of distinct conceptual categories implied by the various uses; and (d) elaboration, the amount of detail given for the generated uses. For example, using a brick as a paperweight represents a different conceptual category that using its volume to conserve water in a toilet tank. The capacity to produce unusual uses is but one example of the general cognitive ability to engage in divergent thinking (Guilford, 1967). Unlike convergent thinking, which converges on the single best answer or solution, divergent thinking comes up with multiple possibilities that might vary greatly in usefulness.

Unfortunately, many different cognitive processes have been linked to creativity (Simonton & Damian, 2013). That is why we cannot use the singular; there is no such thing as the “creative process.” Nonetheless, the various processes do share one feature: All enable the person to “think outside the box” imposed by routine thinking—to venture into territory that would otherwise be ignored (Simonton, 2011). Creativity requires that you go where you don’t know where you’re going.

### Personal Characteristics: Who Is Creative?

Can anybody be creative? Or is creativity subject to individual differences, such as intelligence? Might creativity even be normally distributed just like scores on IQ tests? The answer is complex. Unlike general intelligence, which represents a more or less cohesive cognitive ability, creativity is just as much a personal attribute as an intellectual capacity. This feature is evident in the fact that some “creativity tests” are actually measures of personality, interests, and values (Simonton, 2003b). An example is the Creative Personality Scale of the Gough Adjective Check List (Gough, 1979; see also Carson, Peterson, & Higgins, 2005). In this measure, a person is asked to check off whatever adjectives are viewed as especially self-descriptive. The relevant adjectives are shown in Table 1. How would you describe yourself? Would you use more adjectives in the left column or the right column?

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Table 1. The Creative Personality Scale of the Gough (1979) Adjective Check List. Note. The Adjective Check List actually contains 300 adjectives arranged in alphabetical order from “absent-minded” to “zany,” but the above adjectives are the only ones scored.

Another reason to speak of the “creative personality” is that creativity correlates with scores on standard personality measures (Feist, 1998). Most notably, the creative person is more likely to score on the openness-to-experience factor of the Big Five Factor Model (Carson, Peterson, & Higgins, 2005; Harris, 2004; McCrae, 1987). This factor concerns
whether a person has a strong intellectual curiosity, preference for variety, and an active imagination and is aesthetically sensitive, attentive to inner feelings, as well as receptive to new ideas and values. It would seem obvious that persons high on this factor would behave differently than those scoring low. For instance, we would expect such persons to be less conventional, to have a wider range of leisure activities, and to be more versatile. Yet, it is equally important to note that people high in openness also think differently. Besides scoring higher in divergent thinking (Carson, Peterson, & Higgins, 2005), openness is also associated with the diminished capacity to filter out extraneous information, a tendency often called cognitive disinhibition or reduced latent inhibition (Peterson & Carson, 2000). This “defocused attention” enables the creative person to make observations that others would overlook—such as what happens in serendipitous discovery. A classic example was when Alexander Flemming noticed that a bacteria culture was being killed by a certain mold, a discovery that directly led to penicillin.

Leonardo da Vinci's design for a flying machine. Leonardo spent years as a young man working as an artist's apprentice and later studied subjects such as engineering, anatomy, and mathematics. [Image: CC0 Public Domain, https://goo.gl/m25gce]

Now you may wonder, isn't cognitive disinhibition a bad way of thinking? Isn't it a good thing to be able to ignore irrelevant stimuli? The answer is yes. In fact, reduced latent inhibition is also connected with mental illness (Carson, 2011; Eysenck, 1995). Thus arises a link between creativity and psychopathology (Simonton, 2010). Even so, creative individuals are seldom outright mentally ill. Instead, creators possess other personal traits and capacities that convert a potential cognitive disability into an exceptional ability (Carson, 2011). Among the most important of these characteristics is high general intelligence (Carson, Peterson, & Higgins, 2005; Kéri, 2011). The creator then has the capacity not just to generate original and surprising ideas but also to test and develop them for usefulness. Mental illness arises when the person always skips the last step—the reality check.

At this point, we must add an important qualification: For Big-C Creativity, you have to have more going for you than boasting a creative personality that can engage in creative thought. You also must acquire appropriate expertise in the domain in which you hope to make creative contributions. Einstein had to learn physics and mathematics; Leonardo da Vinci had to learn how to draw and paint. In fact, it typically requires about a decade of extensive training and practice before a person can become a Big-C Creator (Ericsson, 1996). Even so, just because you become an expert in your field it does not mean that you'll be creative, too.
Social Contexts: What Environments Affect Creativity?

Although creativity is often viewed as an entirely psychological phenomenon, research by social psychologists shows that certain social environments have a part to play as well. These contextual influences can assume many forms. Sometimes these effects are relatively short term or transient. Other times the effects can be more long lasting.

To illustrate the former possibility, creativity is often enhanced when persons are exposed to incongruous or novel stimuli. For example, one recent experiment used virtual reality to create three conditions (Ritter et al., 2012). In one condition, participants walked around in a room in which the normal laws of physics were violated. Objects fell up rather than fell down, and the objects got smaller as you approached them rather than getting bigger. In a second condition, the participants were in the same virtual reality situation, but everything behaved as it would in normal reality. In the third and last condition, the participants merely saw a film clip of what the participants in the first condition experienced—a passive rather than active exposure to an otherworldly environment. Only those who directly experienced the strange environment showed an increase in cognitive flexibility, an important component of creativity, as noted earlier. In a second experiment, the participants were again subjected to three conditions, but this time the manipulation concerned cultural scripts—in this case, the customary way to make a popular breakfast meal. Only those participants who directly experienced the violation of the norms showed an increase in cognitive flexibility. Those who made breakfast the normal way or who vicariously watched somebody else make breakfast an unusual way showed no effect.

The above effect is most likely transient. It is doubtful that those participants exposed to such incongruous experiences would exhibit any long-term change in their creativity. But what would happen if the exposure was much longer, years rather than minutes? Then the benefit might endure a lifetime. An example is the long-term benefits that accrue to persons who have acquired multicultural experiences, such as living in a foreign country for a significant amount of time (Leung, Maddux, Galinsky, & Chiu, 2008). Daily life abroad exposes a person to different ways of doing everyday activities. Moreover, because the visitor quickly learns that “when in Rome do as the Romans do,” the exposure becomes direct rather than vicarious (Maddux, Adam, & Galinsky, 2010). To be sure, not everybody’s creativity benefits from multicultural environments. The person also has to score high on openness to experience (Leung & Chiu, 2008). Otherwise, they will close themselves off from the potential stimulation, and then just gripe about the “peculiar customs of the natives” rather than actively practice those customs—such as making a totally different breakfast!


Finally, both little-c and Big-C creativity—but especially the latter—are more likely to appear in specific sociocultural systems (Simonton, 2003a). Some political, social, cultural, and economic environments are supportive of exceptional creativity, whereas others tend to suppress if not destroy creativity. For this reason, the history of any civilization or nation tends to have “Dark Ages” as well as “Golden Ages.” Early medieval Europe illustrates the former, while Renaissance Italy exemplifies the latter. It would take us too far beyond introductory psychology to discuss all of the
relevant factors. Yet, one factor fits nicely with what was discussed in the previous paragraph. Highly creative societies are far more likely to be multicultural, with abundant influences from other civilizations. For instance, Japanese civilization tended to undergo a revival of creativity after the infusion of new ideas from other civilizations, including Korean, Chinese, Indian, and European (Simonton, 1997). This influx involved not just Japanese living abroad but also non-Japanese immigrating to Japan.

**Conclusion**

Creativity certainly must be considered a crucial human behavior. Indeed, like language, creativity sets *Homo sapiens* well apart from even our closest evolutionary relatives. It is virtually impossible to imagine a world in which all of the products of the creative mind were removed. I couldn’t even type this very sentence at this instant. Even the alphabet was invented. Creativity permeates every aspect of modern life: technology, science, literature, the visual arts, music, cooking, sports, politics, war, business, advertising ... well, I could go on and on. Fortunately, psychologists have made major strides in understanding the phenomenon. In fact, some of the best studies of creativity are also excellent examples of scientific creativity. At the same time, it remains clear that we still have a long ways to go before we know everything we need to know about the psychology of creativity. Hence, creativity research has a bright future.

**Outside Resources**

**Video: Amy Tan: Where does creativity hide?**
http://www.ted.com/talks/amy_tan_on_creativity.html

**Video: Creativity science**

Media, iframe, embed and object tags are not supported inside of a PDF.

**Video: How to be creative**

Media, iframe, embed and object tags are not supported inside of a PDF.

**Web: American Creativity Association**
http://www.aca.cloverpad.org/

**Web: Be More Creative**
http://www.bemorecreative.com/

**Web: Creating Minds**
http://creatingminds.org/

**Web: Creative Quotations**
http://www.creativequotations.com/
Discussion Questions

1. To be creative an idea must be useful. Although it is easy to see how a new invention can be useful, what does it mean for a scientific discovery or artistic composition to be useful? When, in 1865, Mendel discovered that the traits of peas were inherited according to genetic laws, what possible use could that finding have at the time? What conceivable utility could there be for a painting by Van Gogh or a poem by Dickinson? Should some other word be used, such as valuable or appropriate? Or, should we acknowledge that a theory, painting, or poem is useful in a different way than an invention? Can a new idea be creative just because it satisfies our intellectual curiosity or aesthetic appreciation?

2. Computers can do some amazing things—such as beat humans at chess and Jeopardy! But, do you think that they can ever display genuine creativity? Will a computer one day make a scientific discovery or write a poem that earns it a Nobel Prize? If not, why not? If so, who should get the award money, the computer or the computer’s programmer?

3. All of the personal characteristics of very creative people are also highly inheritable. For instance, intelligence, openness to experience, and cognitive disinhibition all have a partial genetic basis. Does that mean that creators are born and not made?

4. Highly creative people believe that they possess certain personality traits. If you make yourself have the same traits, will that make you more creative? For example, will you become more creative if you become more egotistical, individualistic, informal, reflective, self-confident, sexy, and unconventional? Or, how about widening your interests and becoming more open to experience? Which comes first, the personality or the capacity?

Vocabulary

**Big-C Creativity**
Creative ideas that have an impact well beyond the everyday life of home or work. At the highest level, this kind of creativity is that of the creative genius.

**Convergent thinking**
The opposite of divergent thinking, the capacity to narrow in on the single “correct” answer or solution to a given question or problem (e.g., giving the right response on an intelligence test).

**Divergent thinking**
The opposite of convergent thinking, the capacity for exploring multiple potential answers or solutions to a given question or problem (e.g., coming up with many different uses for a common object).

**Latent inhibition**
The ability to filter out extraneous stimuli, concentrating only on the information that is deemed relevant. Reduced latent inhibition is associated with higher creativity.

**Little-c creativity**
Creative ideas that appear at the personal level, whether the home or the workplace. Such creativity needs not have a larger impact to be considered creative.

**Multicultural experiences**
Individual exposure to two or more cultures, such as obtained by living abroad, emigrating to another country, or working or going to school in a culturally diverse setting.
Openness to experience
One of the factors of the Big Five Model of personality, the factor assesses the degree that a person is open to different or new values, interests, and activities.

Originality
When an idea or solution has a low probability of occurrence.

Remote associations
Associations between words or concepts that are semantically distant and thus relatively unusual or original.

Unusual uses
A test of divergent thinking that asks participants to find many uses for commonplace objects, such as a brick or paperclip.

References


