High-Level Creativity for Nonprofit and For-Profit Organizations: Inspiration or Perspiration

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Description, Abstract, or Artist's Statement

Creativity is valued as an essential human ability. For much of recorded history, the ability to produce creative outcomes has been seen as a gift bestowed rather than as a capacity commonly existing in humans. In more recent times, however, research has suggested that there are a number of personal attributes commonly present in individuals who have established a reputation for being creative in their respective fields. Findings from a recent research study support this assertion. The eight participants in this study were high-achieving and highly creative individuals who had received the prestigious MacArthur Foundation award for creativity. They work in a range of fields including physics, agriculture, computer technology, human rights, conservation, pharmaceuticals, environmental policy, and music. Each is a founder of either a for-profit or nonprofit organization. Findings suggested that the study participants rely on specific habits and practices in their pursuit of creative outcomes. Particularly important are (a) the ability to take a big picture view of a situation, (b) the tendency to combine disparate ideas, and (c) the capacity to live with ambiguity during the creative process.

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Creativity: Inspiration or Perspiration

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Abstract

Creativity is valued as an essential human ability. For much of recorded history, the ability to produce creative outcomes has been seen as a gift bestowed rather than as a capacity commonly existing in humans. In more recent times, however, research has suggested that there are a number of personal attributes commonly present in individuals who have established a reputation for being creative in their respective fields. Findings from a recent research study support this assertion and add to the knowledge base concerning creativity. The eight participants in the study were MacArthur Fellows, high-achieving and highly creative individuals who have received the prestigious MacArthur Foundation award for creativity. The study participants work in a range of fields including physics, agriculture, computer technology, human rights, conservation, pharmaceuticals, environmental policy, and music, and all are founders of either for-profit or nonprofit organizations. Findings suggested that the study participants rely on specific habits and practices in their pursuit of creative outcomes. Particularly important are (a) the ability to take a big picture view of a situation, (b) the tendency to combine disparate ideas, and (c) the capacity to live with ambiguity during the creative process.

Creativity: Inspiration or Perspiration

Introduction

Creativity has long been valued by society. Humankind's creativity is so transformational that it has supported the development of civilization and contributed to the overall success of humans on the planet (Hennessey & Amabile, 2010). Not only has creativity been the source of innovations and advancements, but it also has contributed to effective problem solving that has helped civilizations resolve difficult societal issues (Lubart, 1994).

While creativity is often considered within a framework of individual artistic expression where artists, writers, and performers have strived to produce beautiful works that are presented to the public for display and acclaim, other types of creativity have also been valued. Military leaders have been praised for their creative battle strategies and philosophers have competed for the approbation of society. Inventions that supported the development of agriculture have helped feed a growing world population and advancements in medicine and other scientific fields have helped solve numerous problems. As commerce developed in society and the importance of trade was acknowledged, creative products and business models took hold in intra community trading and in trading enterprises between societies.

For centuries conventional wisdom held that creativity was an innate ability that some individuals experienced or displayed. Creativity was first thought to be a "gift of the muses" (Lubart, 1994; Smith, 2011). The idea that creativity came from divine inspiration meant that there was little hope of understanding its nature or focusing its power (Guilford, 1968). In addition, Amabile (1983) pointed out that researchers hesitated to even define creativity because it was unknown and unknowable. Moreover, there remained a lingering sense that creativity and

mental illness went hand-in-hand so being characterized as creative was not always a valued and sought after label (Feist, 2012; Hennessey & Amabile, 2010).

As human civilization advanced and knowledge began to supplant magical explanations for creativity, a shift occurred: rather than seeing creativity as an unpredictable and inexplicable power derived from inspiration, creativity began to be seen as an internal ability of individuals (Runco, 2011; Smith, 2011). At least in part, creativity was considered to be a personality trait (Feldhusen & Goh, 1995; Guilford, 1968; Kurtzberg, 2005; Lubart, 1994). Moreover, the trait was one that was distributed in the population as a whole (Guilford, 1968). Guilford further speculated that the ability to be creative resulted from inherited DNA, but might also result from environmental determinants. As the study of creativity expanded, researchers began to see that creativity was more common than once thought. This led researchers to focus on the transferability potential of creativity and suggested that training to promote creativity could be highly effective (Brophy, 1998; Caughron & Mumford, 2011; Guilford, 1968; Hennessey & Amabile, 2010; Scott, Leritz, & Mumford, 2004).

As researchers have gained a somewhat better understanding of the term *creativity*—understanding its genesis and nature, there has been a slow transformation of thought. The ability to be creative, which was first understood to be a product of inspiration, is now understood to be, at least to some extent, a learnable skill. Researchers have, to a great extent, put aside old beliefs about the innateness and inherent nature of creativity, focusing now more commonly on the habits and practices of creative individuals.

This article supports the idea that creative people are innovative, in part, because they have developed specific habits and practices that sustain their creativity. Their creative outputs stem from their dedication to these habits and practices, and are, in many cases, related to hard

work. The maxim: genius is 1% inspiration and 99% perspiration may actually represent an important way of looking at creativity. The adage may also encourage individuals to exercise their ability to be creative by honing their work habits. Moreover, if creative approaches to problem solving may be considered to have a foundation in habit and practice, then the general population may benefit from understanding these principles.

Past researchers have identified habits and practices that they suggested have a role in activating, developing, and sustaining creativity. The findings of this study support the work of these researchers, and this article presents supporting evidence of three important habits and practices: (a) the ability to take a big picture view of a situation, (b) the tendency to combine disparate ideas, and (c) the capacity to live with ambiguity during the creative process.

Identifying Creativity Through Eminence

In any discussion of creativity, one of the central issues is how creativity is defined and evaluated. A great deal of research time has been spent investigating measurements of creativity. One approach that is attractive based on its relative simplicity and logically deductive appeal is known as the study of creativity based on *eminence* where study participants are acknowledged as distinguished in their fields on the basis of producing work (output in the form of concrete product) that has been individually judged as creative. This approach asserts that the best judges of creative outputs are experts from individual areas of expertise who have specific background understanding and knowledge of a specific field that gives them the credentials to judge creativity in others. According to Simonton (2011) this approach to judging creativity is sound because specific creative output is prima facie evidence of creative ability and broad acclaim for individual contributions represents a measurement of creativity that may be accepted based on "face validity" (p. 441). In addition, experts who judge creativity through eminence are best able

to understand the field as a whole and are also the best evaluators of the individual creative contribution of a specific piece of work. Variations of the eminence approach have been used in judging creativity since 1870 when Galton first used the approach to select outstanding literary and scientific contributions (Hennessey, Amabile, & Mueller, 2011). Evaluating eminence based on the recommendations of field experts has stood the test of time and continues to be a valuable tool in evaluating individual creative outputs.

Research Focus and Methodology

This article is based on findings from a research study that investigated how creative individuals activate, develop, and sustain their creativity through their decision making. The study was entitled *Decision Making and Creativity: A Qualitative Study of MacArthur Fellows* (Hennessy, 2014). In part, the study investigated the habits and practices of creative individuals.

The research project relied on eminence evaluation: investigating individuals who have been acclaimed for their creativity in various domains. At the heart of the study were eight MacArthur Fellows who have received the prestigious MacArthur Foundation award for creativity.

The MacArthur Foundation is skilled at identifying creative individuals and has awarded prizes for creativity for over 30 years. Moreover, the prize is not only awarded for past work, but is based on the assumption that individual award winners have the potential to contribute more creative outcomes in the future. Between the years 1981 and 2013, 873 individuals have been awarded the prestigious creativity prize and have formally become MacArthur Fellows. Some of the winners have gone on to win Nobel prizes in their fields of study while others have received additional awards for creativity in their specialties. Still others have made creative contributions to various fields. Overall, the individuals awarded the MacArthur prize have a

track record of significant creative achievement and have manifested the potential to continue to expand the boundaries of knowledge and human interaction ("MacArthur Fellow Program," 2013).

Creativity seems to be important to the MacArthur Foundation. Not only are the recipients of the MacArthur prize creative, but also the process of choosing the grant winners is novel. The MacArthur Foundation only considers grant nominations proposed by a select number of external nominators who have been confidentially appointed by the foundation based on their expertise and familiarity with exceptionally creative people in their respective fields ("MacArthur Fellow Program," 2013). The nominators, all experts in their fields, are tasked with identifying the most creative individuals within a narrow spectrum of human activity. After being nominated, a foundation committee of twelve people (separate from the nominating team), chosen for their breadth of experience, excellent judgment, and curiosity prepares a file and evaluates each nominee against the selection criteria. From this group of superior candidates, the selection committee chooses outstanding finalists and presents its completed files to the MacArthur Foundation Board of Directors so that the foundation board can approve and announce the yearly fellowships ("MacArthur Fellow Program," 2013). The nature of the MacArthur Foundation selection process that is based on eminence is the reason that I chose the foundation's fellowship award winners as the population for the study.

The participants of this research study represented a subset of MacArthur Fellows. In particular, they have been celebrated for their ability to solve tough social problems. While creativity is often more broadly defined, and the MacArthur Foundation has celebrated the creative work of many artists, dancers, musicians, photographers, writers, and scientists, this study focused more narrowly on individuals who have used their creativity to develop solutions

to a broad range of societal problems that affect the quality of human existence. Specifically, the eight participants in the study were founders and leaders of either for-profit or nonprofit organizations who have used their organizations as platforms to express their creativity. Interviewees worked in a range of fields including physics, agriculture, computer technology, human rights, conservation, pharmaceuticals, environmental policy, and music. All participants have identified creative responses to difficult problems that society has encountered. See Table 1 for a description of the work conducted by the study participants.

The research methodology employed was qualitative and used a face-to-face interview approach to investigate how participants, acclaimed for their creativity, worked through difficult problems to find creative solutions. Specific characteristics, traits, habits, and practices of individuals interviewed were discussed and later analyzed.

The research findings provided an opportunity for rich case and cross-case analyses that allowed for a broader look at creativity. The findings identified participant attributes that appear to foster creativity and also highlighted counterproductive traits that seemed to hamper the production of creative outcomes. In the course of the interviews, the participants had the chance to introspectively evaluate their creative practices and habits and share their insights about developing creative outputs. The research data confirm some of the findings of earlier researchers, and the data support the idea that creativity concerns, at least in part, specific personal attributes associated with explicit habits and practices.

First and Foremost

The overwhelming and unanimous pronouncement of the individuals interviewed was that creativity does not concern genius. Having declined the moniker of genius, the MacArthur Fellows interviewed preferred to discuss their creative success in terms of hard work and the way

that they approach innovation. Rather than being a mysterious gift or an innate part of their

being, they claimed that creativity is a system of habits and practices that increases the chances

of creating novel outcomes. Saul discounts the term genius and lauded the value of intense

work, logical analysis, and critical thinking that in the course of a lifetime, he believes, will

produce more accomplishments. He stated, "I really don't think that there are any geniuses. I

just think that there are people who work hard and rigorously; if you work hard and rigorously,

you will be perceived as a genius" (Hennessy, 2014, p. 80).

The MacArthur Fellows were very precise and detailed when they talked about the habits

and practices that they believe are essential to their ability to be creative. They were able to

articulate the specifics of their approaches. This point, alone, is important. If creativity can be

discussed in terms of a series of distinctive habits and practices, then creativity may be more

specifically articulated and potentially taught to others. In other words, a better understanding of

the way that creative individuals approach a problem and search for a creative answer may help

others successfully emulate their results. This is not, however, an assertion that creativity will be

achieved if practices are followed, but rather reflects the point that a better understanding of how

creative people approach a problem may help others see creativity in more concrete terms and

may help them formulate their own approach to creating innovative outputs. If creativity is

better understood in terms of specific habits and practices, more individuals may attempt to

activate and develop their personal creative abilities.

Creativity: Habits and Practices

When study participants discussed the abilities that they perceived as positively

influencing their ability to be creativity, they generally referred to their personal habits and

practices. A habit is defined as a usual way of behaving. A practice is a behavior that

individuals follow regularly or constantly as an ordinary part of life. Habits and practices are, therefore, closely related and, in this article the two words are often used together and may be considered as synonyms.

So what habits and practices did the MacArthur Fellows point to as important precursors for creativity? They focused on (a) taking a big picture view of a situation, (b) combining disparate ideas, and (c) living in a state of ambiguity during their search for the most creative solution. Following is a more detailed discussion of each point.

Taking a Big Picture View of a Situation

Being able to stand back from a situation and consider the broader circumstances surrounding that situation is an ability that creative people often exhibit (Sternberg, 2006). Other researchers described this broad view ability as an important way to solve problems (Runco, Lubart, & Getz, 2012). In this study, participants agreed with the definition and its importance in establishing creative outcomes. Specifically, participants described big picture analysis as a metaphorical standing back from a situation to see the bigger issues implicit in the particular circumstance.

Four of the eight participants, Saul, Wes, Jim, and Anne agreed that creativity could be enhanced when big picture concerns were incorporated into the search for novel solutions. Participants, however, described their practice of looking at the big picture in different ways and emphasized different aspects of the habit.

Saul emphasized that when he is working on a problem, it is important to look at the associated scientific principles and express them in more generalized and overarching statements that explain a problem in terms of a *physical system*. If flawed reasoning is detected in the explanation of the physical system, a more nuanced and corrected version of the system structure

might then be hypothesized. An improved understanding could then lead to discoveries in the field. Saul's understanding of a big picture approach was reflected in his words. He said:

> And you just look at the whole world through these statements [big picture statements]—I guess some people call these things lenses. It's a hypothesis, and then you test that hypothesis on a whole bunch of examples and occasionally that serves something useful (Hennessy, 2014, p. 89).

An example illustrates Saul's process. In his search for a better way to use natural gas to power automobiles, Saul considered the way natural gas was stored in vehicles. Typically automobiles powered by natural gas are designed with a single large natural gas reservoir that has the shape of a SCUBA tank. According to Saul, this tank shape was simply an accident of history. In reality, tanks for storing natural gas do not need to be large in diameter. By looking at the constructs that guided early scientists, Saul was able to see that there was a faulty assumption about how natural gas should be stored. Having discerned the faulty scientific assumption, Saul could improve the design of natural gas storage by correcting the faulty assertion and implementing a revised scientific picture that more appropriately served his design purpose. In this case, Saul replaced the large and unwieldy tank design with one that stored the same amount of natural gas in a small diameter chamber, albeit long, that could be folded to fit into an automobile infrastructure. The natural gas tank incorporated into the concept car, in effect, was similar in appearance to human intestines packed into the body. The effect of this strategy allowed for a more functional automobile design that did not have to incorporate a large diameter storage tank.

In this situation, the key to Saul's understanding came from analyzing the need for a SCUBA-shaped tank to store natural gas. Recognizing that scientists had incorrectly accepted the premise for the storage of natural gas, he was able to metaphorically step back from the situation and look at a bigger picture to find a more functional scientific solution.

Saul also pointed out that the practice of looking at a big picture view of a situation had served eminent scientists in many fields throughout history. He emphasized that such experts are likely to consider big picture analysis in their search for creative advances in a very precise way. Saul claimed that successful authorities in any specialty are generally extremely knowledgeable about the histories of their fields of study. Specifically, they understand their particular area of expertise in the context of the early pioneering scientists who did the initial work in the field. He stated that history was not only important in understanding the "*why* and the *what* of a field, but also the *when*—the timeline of this thing and all of the *who's* that came before . . . that's the historical environment" (Hennessy, 2014, p. 91). This understanding of history, Saul concluded, was important because a current researcher, having studied the field and having understood the context of earlier work, might be able to recognize a shortcoming in past understanding and/or application of physical laws. Furthermore, he or she might then be able to solve a long standing problem by more appropriately applying a principle of physics and/or by employing new technological advances not available in earlier times. In other words, new eyes on a project and the ability to step back to take a broader view might help to correct the errors of the past and serve as a catalyst for finding new creative solutions to problems.

Wes also values the importance of taking a big picture view to stimulate critical thinking and creativity. He talked about the three ways that he takes a big picture approach to his work. First, he collaborates with scientists from around the world to solve the problems of agriculture. His concept of big picture is large-scale because his area of expertise requires considering the realities of global impact. Wes also looks at a big picture in a second way that supports his creativity. When he talks about the cost of bringing products to market, he recognizes more costs than many farmers and agricultural experts do. For instance, he counts as costs: soil

erosion, chemical contamination of land and water by pesticide and fertilizer run off, greenhouse emissions, and the environmental costs of using additional fossil fuels in the agricultural process. Pointing out that the energy investment in farming is undervalued in expense calculations, Wes looks at the biggest picture of costs to the environment and reminds us that someone needs to pay these costs. Finally, Wes takes a big picture look at the mindless and dangerous shortsightedness present in agri-business that fails to consider future generations in the calculations of cost. By taking this broad view, Wes incorporates the far-reaching impact of agriculture on human existence into his understanding and can better underscore its overall importance to humankind.

Like Saul, Wes also augments his understanding of the big picture by using the lessons of history to enlighten his understanding of a situation. He uses history to help him understand today's issues because he believes that by understanding the motivations and precepts of earlier times, he can shed light on the human condition as he observes it today. In effect, Wes uses creative analysis to uncover and understand the metaphors and analogies of history. He can then relate these concepts and issues to present day life. For instance, he explained how he incorporates the concepts of big picture and history to inform his thoughts concerning current Middle East struggles. He described how having read the *Epic of Gilgamesh*[1] has influenced his understanding of Middle Eastern culture and politics. Recognizing how the epic story, written so long ago, portends some of the problems of the present has helped Wes understand current day political and social issues in the Middle East. Wes talked about this understanding as the need to

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[1] Multiple anonymous authors wrote this epic story, perhaps the oldest written story on earth. It was originally written on 12 clay tablets in cuneiform script. It is about the adventures of the historical King of Uruk (somewhere between 2750 and 2500 BCE) who goes on a journey to find the secret of immortality.

"honor the mythmakers [the authors of such ancient texts]" in order to gain an enhanced understanding of mankind's existence (Hennessy, 2014, p. 112).

When Jim is in the process of creating new and innovative products, he is also able to step back and look at a broader perspective of the world. This ability helps him consider which projects he should select to provide the most help to communities in need. He discussed with me the importance of looking at the "larger patterns of how things change in society" (Hennessy, 2014, p. 136). The understanding of how societies change is important because the forces associated with societal change influence Jim's work. In talking about the future of his organization, he used a supertanker metaphor. He noted that large ships (like an organization) take time to change course. Being able to anticipate forces that portend societal changes, in other words, helps Jim guide his nonprofit so that the organization can continue to innovate in the most appropriate areas.

Jim provided an example: Some years ago Jim noted increasing societal concern about human rights violations. This recognition suggested the need to develop software and other products for advocacy organizations. Anticipating the needs of human rights advocates who are often in the field, Jim developed a software application that allows human rights defenders to gather and secure information and images that document human rights violations. The information is automatically copied to a secure network for later access. This means that the software residing on an individual computer may be deleted to protect the personal safety of the human rights advocate who may face grave danger in recording local events.

Current events have confirmed Jim's understanding of the need for software to support human rights activists. Because Jim was able to take a big picture view of the world a few years ago, he was able to anticipate the products that would be required. He was then able to have

products ready when the need became great. In anticipating the need, Jim demonstrates how his ability to take a big picture view of a situation helps him creatively fashion products that will be needed in the future.

During the interview that I conducted with Anne, she described another way of thinking about big picture analysis. She has found creative success in constructing opportunities for groups to look at the big picture in order to encourage collaboration. Anne called this big picture view, the *interspace* approach. She described this method as finding a space—an interspace— where multiple interests could be satisfied. Anne explained it this way. "If you develop a range of solutions that might meet one person's needs and a range of solutions that might meet another person's needs, you'll find that there's some overlap there" (Hennessy, 2014, p. 176-177). What Anne was suggesting is that solutions, even to tough problems, often can be found in the overlap. If opposing sides could look for the overlap and give up their precise and detailed a priori positions, more progress could be made in creatively finding solutions. The overlap is another way of considering a big picture view of a situation.

Anne noted, for instance, that when she brought groups together to discuss business and environmental issues, not all people shared the same views on specific issues, but they, at least, had a common view of the larger picture; that is they shared the same hopeful vision of prosperous communities inhabited by people who were able to enjoy nature's gifts. Since the various members shared some general community goals, Anne wanted to keep highlighting those general goals so that the group would focus there rather than on the specific details of individual positions that were more likely to cause intergroup conflict. According to Anne, if an interests approach is taken and people focus on a big picture, individuals are less likely to take sides over

an issue and end up creating zero-sum competitions. Of course, Anne was pointing out the futility of such interactions, recognizing that little is gained when a situation devolves like this.

Anne suggested that her strength is in helping people see the big picture and helping them look for the interspace. According to her, there is a "certain sophistication about process that's required to . . . tease out those solutions that will work for lots of different people in the room" (Hennessy, 2014, p. 177). Recognizing that people typically bring their positions rather than their more general interests to the table, Anne seeks to turn the zero-sum game of positions into a big picture expression of a win-win based on the commonality of interests.

Anne creatively approaches such problem scenarios. Her recognition of the difference between position and interest is, itself, somewhat novel and, consequently, more than a little creative, and her nuanced approach to collaborative decision making has helped her bring groups, often with opposing positions, through successful negotiations.

While each of the MacArthur Fellows interviewed considered the idea of a big picture view of a situation in a slightly different way, the foundational concept of a broader analysis of a situation remains the same in each case. Notable, however, was the fact that two participants pointed to the importance of history in understanding a big picture. This specific nuance to understanding a big picture view of a situation may be an important consideration within the larger concept.

Combining Disparate Ideas

Combining disparate ideas refers to an ability to bring together ideas from different fields or from diverse areas of activity. Ideas and tenets coming from various backgrounds are then combined to suggest a novel understanding or solution to a problem: potentially an understanding or solution that may be considered creative despite the fact that no new ideas have

been generated. This sort of creativity is based on the creativity of the combination rather than on the creativity of the individual ideas.

Creativity researchers agree that creative outcomes sometimes are developed when individuals think divergently and assemble disparate ideas (Casakin, Davidovitch, & Milgram, 2010; Lubart, 1994). In particular, seeking information in various fields may lead to creative insight (Runco et al., 2012). Also, Dietrich (2004) held that what he called cognitive flexibility was important as this ability could lead to the breaking of conventional patterns of thinking which, in turn, could lead to the combining of disparate ideas.

In this study, half of the eight study participants, Wes, Jim, Saul, and Susan, shared the idea that bringing together disparate ideas could enhance their ability to be creative. The combining of disparate ideas meant slightly different things to each of the participants.

Wes likes to combine knowledge in new ways. He described his skill as an ability to turn traditional "notions on their heads," and he likened his interest to looking for the "relatedness of the seemingly unrelated" (Hennessy, 2014, p. 280). It was this propensity that led Wes to what he called his epiphany about agriculture. Wes explained that before his organization was formed, he had been reading a General Accounting Office study on soil erosion and that report worried him because, despite the conservation measures attempted, soil erosion seemed to be continuing. Around the same time, Wes took his students on a field trip to the Konza prairie. He noted that, unlike the grain cropland, the untilled prairie did not suffer from soil erosion. When he examined the two situations in his mind, he realized that the major difference was that farmers planted annual grain crops and that the natural prairie supported perennials where no tilling was needed. Bringing the disparate concepts of farmers' fields and natural prairie growth together with the concern about soil erosion gave Wes an important moment of clarity. Wes understood

that the continuing harvesting and replanting of *annuals* was contributing to the erosion

problems. It was Wes' creative ability to see this connection between the two ways of growing

crops that sparked his creativity. The combining of disparate ideas, in this case, suggested the

cause of the erosion problem, and the creative insight was the understanding of the nature of the

problem that made the fashioning of the response easier.

      According to Wes, this concept was associated with a deeper understanding of subjects

that he was able to acquire by unpacking the traditional concepts of knowledge. He talked about

"forcing knowledge out of its categories" (Hennessy, 2014, p. 105). This concept referred to a

deeper analysis of subjects that could illuminate underlying truths that went beyond accepted

conventional wisdom or societal customs. In questioning the customs of farming, Wes was

probing traditions that go back 10,000 years and are well documented in religious texts.

Nevertheless, his willingness to examine such traditions allowed him to overturn centuries of

beliefs and identify a problem. Having identified the problem, the solution became more

obvious.

      During our interview, Jim related his ability to combine disparate ideas to a passion for

solving problems. Specifically, he said that what he likes about problems, beyond understanding

how to solve them, is figuring out the nature of the difficulty so that he can look for and fashion

new sorts of solutions that may have never before been tried. Jim pointed out that he is always

looking for novel ways to solve problems because it is through novelty that significant gains can

be accomplished. Bringing disparate ideas together is a way for him to combine knowledge from

different fields to help solve a recurring problem.

      One way that Jim creates novel solutions is by repurposing technology from one

application to another. In effect, Jim works to develop alternate ways to use accepted and

already tested technology. Jim, as a student, learned about computer technology that could distinguish between various types of military tanks present on the battlefield. The specific technology represented the ability for computerized weapons systems to direct munitions to strike specific targets (i.e. tanks). When Jim repurposed this technology, he helped develop optical character recognition software that was the key technology that allowed printed text to be read aloud. The optical character recognition technology is similar to the tank targeting technology, except, instead of distinguishing between various types of military tanks, the computer is tasked with identifying specific letters of the alphabet. Despite the obvious differences (in size, shape, and purpose) between military tanks and letters, Jim was able to understand that the same computer technology was underlying both problem scenarios. He was able to pair disparate ideas in developing a solution to a problem. While Wes used the ideas in identifying the problem, Jim combined disparate ideas to solve an already identified problem. Ultimately, Jim's ability to creatively combine disparate ideas had the power to change the lives of people with sight and other disabilities by giving them access to books that can be read aloud.

Jim's approach to creativity may be described as a directed, focused, and, even, a somewhat systematic process rather than one that is solely inspirational in nature. He shared his interest in studying beyond his field of acquired expertise. He said that in order to be innovative, "reading many journals that are not in [my] field is important" (Hennessy, 2014, p. 135). Furthermore, he claimed that his eclectic search for knowledge was "an intentional process of being open to more ideas" and that this systematic search for ideas was integral to his pairing of disparate ideas (Hennessy, 2014, p. 135).

Saul shares Jim's desire and commitment to reading journals and research studies from diverse fields. He wants to be knowledgeable about all of the physical sciences because he

believes that creative solutions can come from knowledge gained in different scientific fields that sometimes combines in novel ways. He noted that the disciplines of biology, chemistry, and physics have been segmented to the point that expertise is now very narrow. This, he felt, could inhibit creativity. In his own work, Saul preferred to think of himself as a natural philosopher that could understand and apply scientific concepts from all three fields to the process of solving scientific problems. Specifically, he said, "I am more of a subscriber [to the idea] that we all should be natural philosophers. Otherwise, all you are merely doing is throwing up artificial distinctions that will ruin your scope" (Hennessy, 2014, p. 92). What Saul meant by this statement was that attempts to specialize narrowly in a field could discourage the combining of disparate ideas because knowledge is too narrowly defined within a field. Instead of allowing his scope to be ruined by specialization, Saul prefers to combine ideas taken from various fields to improve his insight into novel products.

Susan identified and described one of her favorite ways of creating innovative strategies for people with disabilities. She talked about her ability to creatively combine disparate ideas taken from various environments to develop an idea that may never before have been considered or may have been previously discarded as unrealistic. For instance, Susan told me that her response to the government employee who doubted the leadership ability of those who are disabled was to create and schedule a leadership seminar for women with disabilities. She wanted to bring leadership training to the disabled community, in effect, bridging two worlds that had not previously been joined in any substantive fashion. In this manner, Susan brings together disparate ideas in novel environments. She is repurposing ideas from one environment to another.

In expressing their beliefs that disparate ideas can lead to creative outcomes, the participants interviewed pointed out three ways that this combining of ideas can be achieved. Wes used the process to identify problems, Jim and Saul used the methodology to recognize creative solutions, and Susan combined ideas from different environments to fashion answers in a new setting.

A Tolerance for Ambiguity

Lubart (1994) identified a tolerance for ambiguity as an ability that is important in the creative process. Zohar (1997) agreed that thriving on ambiguity during the process of creating was important, and she added that creative thinking can best emerge when the mind is not busy. Kristensen (2004) concurred with the idea of sustained ambiguity and regarded an individual's ability to remain in a state of indecision longer than others as a major contributing factor important in creative thought and solutions.

Kristensen also suggested the term *incubation*, which allowed an idea to process in the background of the brain when an individual moved to another assignment or simply relaxed. Guilford also favored relaxation as a condition that supported insight (Guilford, 1967; Zohar, 1997). Theoretically, the cognitive process of creative problem solving continues unconsciously until insights or illuminations "cut across the barriers of consciousness" (Kristensen, 2004, p. 90). Smith (2011) agreed and described insight as a process that "emerges into consciousness" (p. 654). All of these researchers and theorists agree that the ability to live with ambiguity is important, but beyond being important, they do not definitively explain the process.

Sternberg (2006) did a somewhat better job of explaining the process when he described a tolerance for ambiguity as the individual ability to suspend judgment and refrain from analysis until facts could be acquired. This explanation focuses on the requirement to postpone decisions

associated with a problem until a fuller understanding of the situation is gained and various approaches to the problem can be analyzed. When a better understanding of a situation is acquired, a better and, presumably, more creative response may be fashioned.

In this study, a tolerance for or—ability to live with—ambiguity represented a sort of patience in the decision making realm. A tolerance for ambiguity is the ability to refrain from making a decision in the early stages of problem solving. Rather than jumping to a conclusion, those who can live with ambiguity refrain from concluding that the solution that most readily comes to mind is the best solution. In other words, those who are better at living with ambiguity are willing to examine various potential solutions in search of the best, and presumably, the most creative solution. They are willing to persevere to find the most successful solution, rather than settling for an adequate resolution that can fit the circumstance. Here the emphasis is on quality versus speed of solution.

A tolerance for ambiguity also represents a sort of fortitude—a fortitude that favors continuing to work on a problem that does not have a readily apparent solution. This aspect of living with ambiguity concerns a willingness to continue a search without knowing if there is a viable answer to a problem. It requires an individual to enjoy the process of finding a solution—perhaps as much as finding an actual solution.

Half of the eight study participants indicated that a tolerance for ambiguity was helpful to them in their search for creative solutions. Each of the four was animated when discussing this specific aspect of creativity, and they all seemed to place a high value on their ability to live in a state of indecision during the time that a situation or problem unfolded. For them, a tolerance for ambiguity and an ability to refrain from committing to a decision early in the decision process contributed to their creativity.

Once again, the participants who discussed their views about living with ambiguity had slightly different definitions and understandings of the term. They, however, were very detailed in explaining their specific understanding and approach to tolerating ambiguity.

Wes noted that he was comfortable in a state of ambiguity because it set the stage for him to force knowledge outside of its categories. He pointed out that when he forces knowledge outside of established theoretical categories, he initially generates ambiguity for himself that can trigger his creativity. For that reason, Wes welcomes ambiguity and stated that while we all have the desire to resolve the somewhat uncomfortable feeling, "If we're going to count ourselves as grownups, we've got to be able to tolerate ambiguity" (Hennessy, 2014, p. 114). He continued by saying that a person would know when he or she was embedded in ambiguity. That would be when "you were featuring questions that don't have answers" (Hennessy, 2014, p. 114). Then Wes concluded his discourse about the importance of ambiguity by pointing out a paradox. He said, "You could almost say that if you're asking questions that have an answer, you're probably asking the wrong questions" (Hennessy, 2014, p. 114). In this interchange Wes was sharing part of his creative process—he looks for creative answers and creative possibilities in previously unanswered questions.

Before Susan finds the best way to take action, she may need to pass through a creative space that is imbued with ambiguity and chaos. For some, living in this space is difficult because it requires an individual to suspend judgment until a clear action path becomes obvious. Acknowledging that this space may, at times, be uncomfortable, Susan, still values the opportunity to exist and operate in this nebulous gap. She said, "I love ambiguity" (Hennessy, 2014, p. 155). In discussing ambiguity, she explained that the space was satisfying because "there's no right or no wrong [answer]" (Hennessy, 2014, p. 155). Pointing to the connection

between creativity, ambiguity, and chaos Susan stated, "Ambiguity and, sometimes, a bit of chaos and then let it settle—I think that's part of the creativity thing" (Hennessy, 2014, p. 155). In addition, as she spoke about controlled chaos, she acknowledged her sense that "there is no order, but eventually there will be an order" (Hennessy, 2014, p. 155). In all of these statements, Susan accepts the fact that creativity, for her, may begin in chaos and ambiguity, and then, over time, an order emerges so that her creation can be complete. Fortunately, the interim of ambiguity and chaos, does not discourage or dissuade Susan; rather she sees it as a, sometimes, necessary state that portends a good result.

Anne speaks about a tolerance for ambiguity in terms of her understanding of a project. When she plans a project or strategizes a venture, she is willing to outline the steps needed, but recognizes that she may need to live with ambiguity before details, or even major aspects, of the project are decided. In Anne's experience, a big picture view of the world is related to her high tolerance for ambiguity in a situation. Anne recognizes that she will only fully understand the big picture as a situation develops. She calls this situational progress an "organic development" (Hennessy, 2014, p. 178). For instance, as a project advances, Anne says she is willing to follow a path that is not mapped out in advance. In following the path, she is also willing to make a course correction, if necessary. She said, "I don't need to know four steps down. I just need to know two steps down, and then once I get two steps down, the other two steps will become clearer" (Hennessy, 2014, p. 178). This tolerance for ambiguity requires Anne to have faith in the process. She must be willing to trust that good solutions will become evident as the process develops.

Having a tolerance for ambiguity is also a part of Victoria's creative process, and the inability to know or understand is something with which Victoria can be comfortable. She

compares the process to letting go or surrendering. Victoria said of ambiguity, "You become

more comfortable with it. I can't say you ever welcome it, but you can recognize it. All right,

here we go again. Time to let go" (Hennessy, 2014, p. 201).

Victoria even equated a tolerance for ambiguity with a sense of delayed gratification.

She likened the experience to delayed gratification because she realizes that she might need to

wait for a revelation in order to understand a situation. In talking about accepting ambiguity, she

said, "Accepting that you cannot understand all of it right now. It's just not the right time, but it

[understanding] will come" (Hennessy, 2014, p. 201). For Victoria, this ability to delay

gratification and accept the process of living in a state of ambiguity allows creative notions to

incubate and percolate into fully formed creative ideas.

A Trifecta that Can Support Creativity

In this study, the three abilities: (a) taking a big picture view of a situation, (b) the ability

to combine disparate ideas, and (c) a tolerance for ambiguity were three habits or practices that

were presented by the participants as important to their ability to develop creative outputs.

Additionally, participants often displayed these abilities in combination. That is, the important

practices were often present together. Wes described himself as exhibiting all three of the traits,

and another four of the participants spoke of having two of the three traits.

In looking at the combination of the three habits, there may be some synergy between

them. In particular, this trifecta of practices seems likely to be particularly useful in

environments where creative thinkers confront questions that require interdisciplinary solutions

or where issues are highly complex. Perhaps displaying more than one of the habits leverages

creativity. Possibly the process proceeds as follows. When participants engage in big picture

analysis—the ability to metaphorically step back to take a broader view of the situation—they

need to incorporate some level of ambiguity into their process. This is because they are temporarily halting the process of creative development to consider additional aspects of the situation. This slowing of the process may, in and of itself, let ambiguity creep into the workspace. Furthermore, the big picture analysis is, ultimately, encouraging novel and even potentially disparate ideas to enter the decision environment as the individual seeks a creative solution. Disparate ideas often take the form of tentative solutions that can be tested. Logically then, there is reason to assume that participating in big picture analysis encourages a tolerance for ambiguity and the potential for adopting disparate ideas.

Conclusions

Creativity has been important to human advancement on the planet since before humans recorded their history, and it has helped civilizations grow and advance. Without the ability to be creative, humans could not have secured resources to live and solved problems associated with survival. Until more recent times, however, creativity was assumed to be a gift that few individuals received and could access: rather it was considered an unknowable ability that represented a sort of genius.

More recent understanding of creativity that is based on research has suggested that creativity is an ability that is more broadly distributed and more generally available in human populations. Furthermore, creativity can be developed and advanced with training.

This article considers research that investigated how individuals, who are considered eminent in their fields of expertise, have activated, developed, and sustained their creativity. The study participants were all winners of the MacArthur Foundation prize for creativity. In particular, these MacArthur Fellows have been recognized for their ability to address broad

societal problems that have vexed humankind. They have addressed these problems as founders and leaders of nonprofit and for-profit businesses.

In studying these creative individuals, several specific habits and practices were identified that the participants alleged were important in their personal process of developing creative outcomes in their specific fields of expertise. Three of the most common practices were (a) the ability to take a big picture view of a situation, (b) the practice of combining disparate ideas, and (c) the ability to tolerate ambiguity in the process of creating. These findings support the findings of various other researchers that have investigated these attributes in creative individuals.

Not only were these three specific practices noted by many of the participants, but also a combination of the attributes sometimes appeared together. In other words, the attributes seemed to cluster in some participants suggesting that the trifecta of habits might be important in the development of creativity.

Additionally, the participants agreed that while they are often labeled as geniuses, they dispute the general definition of genius that suggests they have an innate ability to be creative. Rather they maintain that the basic requirements necessary to create outcomes that are judged to be innovative and important to society result from hard work. Put most simply: the ability to be creative may be represented by the adage that genius is 1% inspiration and 99% perspiration. If this is the case, and given a world with many difficult problems, humans cannot afford to ignore the possibility that humans have latent creative talent that may be improved with training. Moreover, mankind's successful future will rely on identifying and promoting this creativity in all humans.

References

Amabile, T. M. (1983). *The social psychology of creativity*. New York, NY: Springer-Verlag.

Brophy, D. R. (1998). Understanding, measuring, and enhancing individual creative problem-solving efforts. *Creativity Research Journal, 11*(2), 123-150.

Casakin, H., Davidovitch, N., & Milgram, R. M. (2010). Creative thinking as a predictor of creative problem solving in architectural design students. *Psychology of Aesthetics, Creativity, and the Arts, 4*(1), 31-35.

Caughron, J. H., & Mumford, M. D. (2011). Creativity training. In M. A. Runco & S. R. Pritzker (Eds.), *Encyclopedia of creativity* (2 ed., Vol. 1, pp. 311-317). Burlington, MA: Elsevier.

Dietrich, A. (2004). The cognitive neuroscience of creativity. *Psychonomic Bulletin & Review, 11*(6), 1011-1026.

Feist, G. J. (2012). Evidence of nonlinear relationships. In M. A. Runco (Ed.), *The creativity research handbok* (Vol. 3, pp. 61-102). New York, NY: Hampton Press.

Feldhusen, J. F., & Goh, B. E. (1995). Assessing and accessing creativity: An integrative review of theory, research, and development. *Creativity Research Journal, 8*(3), 231-247.

Guilford, J. P. (1967). *The nature of human intelligence*. New York, NY: McGraw-Hill.

Guilford, J. P. (1968). *Intelligence, creativity, and their educational implications*. San Diego, CA: Knapp.

Hennessey, B. A., & Amabile, T. M. (2010). Creativity. *Annual Review of Psychology, 61*, 569-598.

Hennessey, B. A., Amabile, T. M., & Mueller, J. S. (2011). Consensual assessment. In M. A. Runco & S. R. Pritzker (Eds.), *Encyclopedia of creativity* (Vol. 1, pp. 253-260). Burlington, MA: Elsevier.

Hennessy, L. A. (2014). *Decision making and creativity: A qualitative study of MacArthur fellows* (Order No. 3580979). Available from ProQuest Dissertations & Theses Full Text. (1544448566). Retrieved from http://0-search.proquest.com.sally.sandiego.edu/docview

Kristensen, T. (2004). The physical context of creativity. *Creativity and Innovation Management, 13*(2), 89-96.

Kurtzberg, T. R. (2005). Feeling creative, being creative: An empirical study of diversity and creativity in teams. *Creatvity Research Journal, 17*(1), 51-65.

Lubart, T. I. (1994). Creativity. In R. J. Sternberg (Ed.), *Thinking and problem solving* (2nd ed., pp. 289-332). San Diego, CA: Academic Press.

MacArthur Fellow Program. (2013). *About the MacArthur Fellows Program.* Retrieved from http://www.macfound.org/programs/fellows/

Runco, M. A. (2011). Creativity complex. In M. A. Runco & S. R. Pritzker (Eds.), *Encyclopedia of creativity* (2 ed., Vol. 1, pp. 292-295). Burlington, MA: Elsevier.

Runco, M. A., Lubart, T. I., & Getz, I. (2012). Creativity and economics. In M. A. Runco (Ed.), *The creativity research handbook* (Vol. 2, pp. 173-198). New York, NY: Hampton Press.

Scott, G., Leritz, L. E., & Mumford, M. D. (2004). The effectiveness of creativity training: A quantitative review. *Creativity Research Journal, 16*(4), 361-388.

Simonton, D. K. (2011). Eminence. In M. A. Runco & S. R. Pritzker (Eds.), *Encyclopedia of creativity* (2 ed., Vol. 1, pp. 441-448). Burlington, MA: Elsevier.

Smith, S. M. (2011). Incubation. In M. A. Runco & S. R. Pritzker (Eds.), *The encyclopedia of creativity* (2 ed., Vol. 1, pp. 653-657). Burlington, MA: Elsevier.

Sternberg, R. J. (2006). The nature of creativity. *Creativity Research Journal, 18*(1), 87-98.

Zohar, D. (1997). *Rewiring the corporate brain*. San Francisco, CA: Berrett-Koehler.

Table 1

Study Participants and Their Work Interests

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Participant   Interests and Accomplishments

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Participant	Interests and Accomplishments
Saul	Inventor who works at the edges of applied physics. He is interested in developing useful products, especially in energy. He founded and leads a laboratory that has made advancements in robotics, solar power, wind energy, and the storage of natural gas for use in automobiles.
Wes	Environmentalist who is trained in biology, botany, and genetics. He has addressed agricultural practices that have had a negative effect on the environment. He founded and leads a nonprofit that develops perennial grains and supports the worldwide adoption of improved agricultural practices.
Jim	Social entrepreneur involved in repurposing software for use in the third sector. His goal is to create significant social change using technology to drive mission accomplishment. He founded and leads a nonprofit that focuses on supporting various advocacy groups and people with disabilities.
Susan	International human rights advocate who seeks to empower people with disabilities. She founded and leads a nonprofit that promotes full societal participation by people with disabilities. The mission is personal as Susan has been a wheelchair user for over 30 years.
Anne	Environmental activist who is determined to create a community based on a foundation of strong social capital, natural capital, and financial capital. The organization she founded provides a safe place for people with varied interests to learn about regional issues and new ways of doing things for the overall benefit of the region.
Victoria	Wants more equity in the availability of health resources and wants those who are voiceless and invisible to be able to avail themselves of modern medical solutions. She founded and leads a nonprofit pharmaceutical company that partners with a for-profit organization. Through her hybrid organization, Victoria arranges for the worldwide distribution of newly developed drugs and medical devices. The products are delivered to developing countries for free or at very low prices.
Wilma	Chemist who provides technical assistance to support citizen and community efforts to fight environmental polluters. The for-profit business that she founded and leads takes on numerous pro bono clients that have been victimized by

polluters, and she is the last and best hope in fights against corporate polluters who are oblivious or indifferent to the environmental disasters they create.

Aaron   Musician who gave up his career as a performing artist to create a nonprofit that supports minority participation and careers in classical music. The mission of the nonprofit is to increase diversity in classical music performance and to bring the joys of classical music to all minority students.

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