

Towards an Understanding of Creativity

by Max Malikow

Creativity is a drug I cannot live without.
– Cecil B. DeMille

*You see things; and you say, "Why?" But I dream
things that never were; and I say, "Why not?"*
– George Bernard Shaw

It would have been presumptuous to have titled this paper "Understanding Creativity." A comprehensive explanation of the "ability to produce ideas that are novel and useful" is currently unavailable and will remain so for some time and possibly forever (Myers and Dewall, 2015, p. 365). This deficiency exists in spite of attempts by many artists as well as researchers from various disciplines to account for the factors that motivate and enable those who are creative. The questions addressed in this treatise are: What is creativity? Why do people create? What are the components of creativity? How do people create?

What is creativity?

One has only to read the first five words of the Hebrew Bible to encounter creativity: "In the beginning God created ..." (Genesis 1:1, NIV). Biblical scholar John Walton offers an analysis of *bara'*, the Hebrew word for create, that contrasts God's creativity with that of human beings:

The verb *bara'* occurs about fifty times in the Old Testament. As often noted, deity is always either the subject or the implied subject (in passive constructions) of the verb. It can therefore be confidently asserted that the activity is inherently a divine activity and not one that humans can perform or participate in (2009, p. 40).

Walton is referring to the theological concept *creatio ex nihilo*, the Latin term for God's unique ability to "create from nothing." This idea is also expressed in the New Testament where it is written, "By faith we understand that the universe was formed at God's command, so that what is seen was not made out of what is

visible" (Hebrews 11:3, NIV). In contrast, human creativity is characterized as *creatio ex materia*, which means to create from preexisting matter. Strictly speaking, when human beings are creating they are synthesizing because they are producing something new from antecedent material. Well known in educational psychology is Benjamin Bloom's Taxonomy of Learning Domains. Presented in 1956, it was intended to promote higher forms of thinking in education. One of Bloom's learning activities is *synthesis*, using acquired information to produce something new. Bloom's Taxonomy was updated in the mid-1990's and synthesis was changed to *creating* (Anderson, Krathwal, et al, 2000). Another educational psychologist, Howard Gardner, defines a creative person as one who "regularly solves problems, fashions products, or defines new questions in a domain in a way that is initially considered novel but that ultimately comes to be accepted in a particular cultural setting" (1993. p. 35). Creativity requires intelligence, but it is not intelligence. Intelligence is the ability to acquire and understand information and utilize it in problem-solving. Like creativity, intelligent behavior is goal-oriented, deliberate, and adaptive. Moreover, intelligence is culturally determined:

Intelligence is a socially constructed concept: Cultures deem "intelligent" whatever attributes label success in those cultures. In the Amazon rainforest, intelligence may be understanding the medical qualities of local plants; in an Ontario high school, it may be superior performance on cognitive tasks. In each context intelligence is the ability to learn from experience, solve problems, and use knowledge to adapt to new situations (Myers, 2010, p. 406).

The difference between creativity and intelligence is originality. Creativity generates ideas that are novel, intelligence utilizes existing ideas. Another feature of creativity is *divergent thinking*, the kind of thinking that produces multiple ideas from a single idea or situation. It is divergent because it offers numerous possible answers to a single question or numerous possible solutions to a single problem. Divergent thinkers are imaginative, original, and adventurous. *Convergent thinking*, divergent thinking's counterpart, is characterized by locating the best answer to a question or best solution to a problem. Divergent thinking generates ideas, convergent thinking sorts them out. Convergent thinking locates the best tool for a given task, divergent thinking leads to multiple, unintended uses for that tool.

In 1970 the manned space flight Apollo-13 experienced an oxygen tank explosion. The lives of the astronauts would have been lost if the engineers on the ground had not been able to improvise new uses for onboard equipment. The original mission,

a lunar landing, was superseded by a rescue operation. Gene Kranz, the flight director on the ground, insisted to his engineers, "Failure is not an option," and added, "I don't care about what anything was *designed* to do, I care about what it *can* do (1995).

There are at least four expressions of creativity: invention, innovation, research, and conversion. Inventors consider a task and believe, "Something can be made to do this better." Johannes Gutenberg invented the printing press (mechanical moving type), a more efficient way to reproduce documents compared to copying them by hand. Cyrus McCormick invented the mechanical reaper, capable of harvesting a crop more quickly than a team of field hands. (McCormick actually brought to fruition the work of his father and a family owned slave, Jo Anderson.) Innovators introduce a new idea or method for doing something. They believe, "There's a better way to do this." Olympic gold medalist Dick Fosbury revolutionized high jumping by launching himself over the bar backwards. Previous to the "Fosbury flop" technique, high jumpers faced the bar when jumping. Fosbury experimented and discovered by turning his back to the bar it enabled him to elevate higher. Fifty years after his innovation nearly all high jumpers use the "flop." James Cameron revolutionized filmmaking by using *motion capture* in making the science fiction movie "Avatar." Motion capture records the actions of human actors and uses the information to animate digital character models or computer animation. Neuroscientist David Eagleman, who collaborated on a book about creativity, described an innovation in prosthetics:

I met this guy who lost his arm in an industrial accident, so he got a prosthetic limb. And one of the cool things is that the engineers who put that together realized there's no point in having the constraints that a normal hand has. So when he rotates, it just keeps rotating. There are no tendons to hold it in place, so he can turn his hand 360 degrees and keep turning it 720 and so on. When I met him and saw his hand, I thought, *what a lovely example of taking something from nature but being able to bend it and improve on it* (Chen, 2017).

An example of innovation from drama is featured in the movie, "The Flight of the Phoenix" (1965). Following the crash of a cargo plane in the desert one of the passengers surveys the damage and proposes building another plane from the wreckage. (In Greek mythology a phoenix is a bird that draws energy from the sun and rises from death to fly again.) The passenger who makes this proposal is an aeronautical engineer. Hopelessly stranded with no other hope for survival, the passengers and pilot agree to the project. Owing to the engineer's innovative and

flexible thinking the "Phoenix" takes flight and all survive. Researchers are investigators who create experiments or other means for gathering data. They approach their work believing, "There's a way to answer this question or solve this problem."

The ingenuity of researchers is often overlooked, even in well-known experiments. Stanley Milgram's "Obedience and Compliance Experiment" demonstrated the capability of people to inflict pain on other people under certain conditions. The structure of his experiment testifies to his creativity. Another example of investigative creativity is the Rosenhan experiment, also known as the "Sane in an Insane Place" study. Psychologist David Rosenhan and seven other mentally healthy associates feigned symptoms in order to be admitted to the psychiatric ward of different hospitals. Once hospitalized, they ceased showing any indications of the conditions that got them admitted (bi-polar disorder or schizophrenia). Rosenhan reported that although he and his confederates were without symptoms, they continued to be treated for schizophrenia over a period of approximately three weeks. During hospitalization, some of their normal activities, like taking notes, were evaluated as manifestations of the disorder. Further, from life histories of the "patients" that were quite normal, the clinicians claimed to have "discovered" the causes of the mental illness (Malikow, 2010, p. 19).

Sculptors, painters, composers, and other artists create by conversion when they observe something and believe, "There is another medium for expressing this." George Frederic Handel considered the life of Jesus Christ as presented in the Bible and composed the oratorio *Messiah*. Singer-songwriter Gordon Lightfoot read a story in *Newsweek* reporting a shipwreck on Lake Superior and wrote a ballad. "The Wreck of the Edmund Fitzgerald." Victor Hugo's classic novel, *Les Misérables*, has been re-expressed as the world's longest running musical.

Why do people create?

To explain what creativity is, analyze its components, and describe the environments in which it occurs do not explain *why* people create. While there are situations in which creativity is motivated by survival, as in the Apollo-13 mission, these situations are exceptions. Most creative endeavors are not motivated by survival, hence the question of why people create. The novelist George Orwell described his creative work as anything but a labor of love:

Writing a book is a horrible, exhausting struggle, like a long bout of some painful illness. One would never undertake such a thing if one were not driven on by some demon whom one can neither resist nor understand. For all one knows that demon is the same instinct that makes a baby squall for attention (2005, p. 10).

Still, he described writing as something of a calling:

From a very early age, perhaps the age of five or six, I knew that when I grew up that I should be a writer. Between the ages of about seventeen and twenty-four I tried to abandon this idea, but I did so with the consciousness that I was outraging my true nature and that sooner or later I should have to settle down and write books (2005, p.1).

Orwell speculated there are four motives for writing, each existing to varying degrees in different writers as well as within the same writer at different times:

1. sheer egoism: the desire to be seen as clever, talked about, and remembered after death
2. aesthetic enthusiasm: the experience of beauty in the right arrangement of words and pleasure in their sound
3. historical impulse: the desire to locate facts and preserve them for posterity
4. political purpose: the desire to influence society, to push the world in a certain direction (2005, pp. 4-5)

Other writers have offered different explanations for their motivation. Ernest Hemingway said it was only when he was writing that he didn't feel like he was wasting his time. JoAnn Windsinger believes she writes "to make sense of it all" (Malikow, 2012, p. vii). Eric Hoffer reflected, "I do not think of myself as a writer," but added, "I write because I must" (1983, p. 94). And Stephen King, when asked if writing is a compulsion, responded,

It's a compulsion. For one thing, when I was younger, my head was like a traffic jam full of ideas, and they were all jostling, and they all wanted to get out. And I wrote a lot more than I write now. I still write every day (Mason, 2013).

In *Physics*, also referred to as *The Metaphysics*, Aristotle responds to the monumental question, "How can this world be understood?" Included in his response are *four causes: material, formal, efficient, and final*. He explains everything in the world can be understood in terms of its physical components (*material*), design (*formal*), energizing agent (*efficient*), and purpose (*final*). For example, the complete explanation for a table is that it is made of wood (*material*), has a flat, rectangular surface and four legs of equal length (*formal*), was constructed by a carpenter (*efficient*), and is used for dining or working (*final*). Applying Aristotle's four causes to the question, "Why did Shakespeare write *Hamlet*?" would take this form:

1. Shakespeare used a chair, desk, pen, ink, and paper (*material*).
2. He sat on the chair, behind the desk, with the paper in front of him, and the pen and ink within arm's length (*formal*).
3. He used his imagination to produce the story (*efficient*).
4. He had the intrinsic desire to write and share this story in written form (*final*).

While this analysis might seem complete, it does not explain Shakespeare's intrinsic desire to write and share this story in written form. A plausible explanation for this is found in the list of *psychogenic needs* compiled by the renowned psychologist Henry Murray. He theorized there are 29 universal needs that explain human behavior and any action taken by a person can be understood as an attempt to satisfy one or more of these needs (1938). Applying Murray's theory to explain Shakespeare's desire to write might take this form:

1. achievement: the need to accomplish a task
2. construction: the need to build or produce something
3. cognizance: the need to understand something
4. exhibition: the need to impress people with words or actions
5. recognition: the need to receive praise

Of course, an interview with Shakespeare would be required to know with

certainty why he felt compelled to write and even he might not be able to explain his motivation. He might have been driven by the same demon Orwell could neither resist nor understand. Whatever it was that motivated Shakespeare to write *Hamlet*, it was not visible. Like Hamlet, he had "that within which passeth shew" (I.2.85).

What are the components of creativity?

In 1974 a major league baseball player named Tommy John had severe ligament damage in his left elbow. A left-handed pitcher, he was told by the team's orthopedic surgeon, Dr. Frank Jobe, that his baseball career was over because there was no surgery to repair this injury. Upon hearing this, John asked the doctor to invent one. This request led to *ulnar collateral ligament reconstruction*, a surgical procedure in which a tendon from another part of the body is transplanted to replace the damaged ligament. This operation, invented by Dr. Jobe, added 14 years to John's career. It revolutionized sports medicine and currently one-third of major league pitchers have had "Tommy John Surgery." Dr. Jobe's son, Christopher, also an orthopedic surgeon, said of his father, "He was the most natural orthopedic surgeon I have ever watched. He wasn't one to start with theory and then come up with solution. He went directly from problem to solution; it was often the rest of us who sought out the theory" (Hoffheinz, 2014). Robert Sternberg and Todd Lubart have proposed five components of creativity (Myers, 2010, pp. 411-412):

1. expertise: knowledge upon which to build a new idea
2. imaginative thinking skills: the ability to visualize something new
3. a venturesome personality: a willingness to take risks and experience failure
4. intrinsic motivation: intense interest and desire to meet a challenge
5. a creative environment: supportive people who provide encouragement

Dr. Frank Jobe is a composite of these five characteristics of a creative person. His medical training and experience as a surgeon provided him with expertise. His imagination enabled him to visualize relocating a tendon to replace a ligament. He was venturesome as shown by his willingness to be a pioneer with no guarantee of

success. His motivation was driven by his curiosity and resolve to confront a challenge. And Tommy John's willingness to be the patient for an unprecedented surgery contributed to a creative environment.

A sixth component to creativity is the ability to add to experience. The novelist Alice Sebold was raped when walking through a park near the campus of Syracuse University where she was a student. Her memoir, *Lucky*, recounts the horrific experience. (A police officer told her she was lucky to have survived because another woman had been raped, murdered, and dismembered in the same park.) Sebold's second book, *The Lovely Bones*, is a novel in which a 14-year-old girl is abducted and murdered. Concerning her personal experience and writing Sebold has said,

I was motivated to write about violence because I believe it's not unusual. I see it as just a part of life, and I think we get in trouble when we separate people who've experienced it from those who haven't. Though it's a horrible experience, it's not as if violence hasn't affected many of us" (Darby, 2002).

In addition, creative people have the ability to concentrate. In his memoir, *Why I Write*, Orwell describes working under conditions most people would find hugely distracting:

As I write, highly civilized human beings are flying overhead, trying to kill me. They do not feel any enmity against me as an individual, nor I against them. They are "only doing their duty," as the saying goes. Most of them, I have no doubt, are kind-hearted law abiding men who would never dream of committing murder in private life. On the other hand, if one of them succeeds in blowing me to pieces with a well-placed bomb, he will never sleep any the worse for it. He is serving his country, which has the power to absolve him evil (2005, p. 11).

Finally, it is not unusual for creative people to require extended periods of isolation. In *Solitude: A Return to the Self* psychiatrist Anthony Storr opposes the widely held belief that the choice of a solitary life is necessarily pathological. Edward Gibbon observed, "Conversation enriches the understanding, but solitude is the school of genius" (2018). Storr agrees and has written:

Gibbon is surely right. The majority of poets, novelists, composers, and, to a lesser extent, painters and sculptors, are bound to spend a great deal

of time alone, as Gibbon himself did. Current wisdom, especially that propagated by various schools of psychoanalysis, assumes that man is a social being who needs the companionship and affection of other human beings from cradle to grave... Yet the lives of creative individuals often seem to run counter to this assumption. ... Modern insistence that true happiness can only be found in intimate attachments, more especially in sexual fulfillment, does not allow a place for characters like Gibbon (1988, pp. ix, xi).

Creativity and Neurology

Cartoonists display creativity by seeing things in new ways or making unexpected, unusual connections. Gary Larsen is one of the world's most popular cartoonists. Before his retirement in 1995 his cartoon series, "The Far Side," was internationally syndicated in over 1,900 newspapers. His 23 books of collected cartoons have combined sales of more than 45 million copies (Weise, 2006). Concerning his creativity he has said:

If you would allow me any talent, it's simply this: I can for whatever reason, reach down into my own brain, feel around in all the mush, find and extract something from my persona, and then graft it onto an idea (Myers, 2010, p. 411).

Larsen's analysis is hardly a precise neurological assessment. Eagleman, who is a neuroscientist, also admits to uncertainty as to how the brain works when creating:

It is not clear at this moment in time how the brain does this. There's so much at this point that we still don't know. It's not a very basic question like, *how are inputs stored?* It's something that awaits better technology and future discoveries (Chen, 2017).

In spite of this ambiguity, a consideration of the components of creativity would be incomplete if brain functioning were not included. In July, 2015 a panel of neurologists, psychologists, social scientists, and educators convened in Santa Fe, New Mexico to discuss *How Creativity Works in the Brain*. One of the questions addressed at this conference was: "What is the anatomy of an 'aha' moment? (Gute and Gute, 2015, p. 7). When the Greek mathematician Archimedes was wrestling with the problem of how to determine the purity of gold, he made the sudden realization that when an object is immersed in water it displaces a volume of water

equal to its own volume. Therefore, by measuring the volume of water displaced, the volume of the object could be determined, regardless of its shape. According to legend, he made this discovery at a public bathhouse when immersing himself in water, whereupon he leapt out of his bath exclaiming, "*Heureka! Heureka!*" ("I have found it!") and ran home naked through the streets. Similarly, mathematician Andrew Wiles pondered mathematic's most famous problem, *Fermat's last theorem*, for more than 30 years.

Then, one morning, out of the blue, the final "incredible revelation" struck him. "It was so indescribably beautiful; it was so simple and so elegant. I couldn't understand how I'd missed it and I just stared at it in disbelief for 20 minutes" (Sing, 1997, p. 25).

Exactly what happened in the brain circuitry of Archimedes and Wiles at the moment of their discoveries? Roger Beaty is among the neuroscientists working to answer this question. He conducted a study in which 163 participants engaged in the "Alternate Uses Task." The task requires subjects to create new and unusual uses for common objects. For example, when presented with a sock a subject might respond with, "use it to warm your feet." A more creative participant might respond, "use it as a water filtration system."

The participants underwent fMRI scans (brain scans that measure blood flow to different parts of the brain) as they completed the task. What Beaty and his team found was that participants who came up with better ideas activated certain brain networks that less creative participants did not. "We found that the brain regions within the 'higher creative' network belonged to three specific brain systems: the default, salient, and executive networks," says Beaty (Briggs, 2018).

Beaty added that everybody has these networks but creative people activate them simultaneously while most people activate them separately. Psychologist Kay Redfield Jamison reports a similar finding from her research on manic-depressive illness and the artistic temperament: "Making connections between opposites, crucial to the creative process, is in many respects a specialized case of making connections in general, of seeing resemblances between previously unassociated conditions or objects (1983, p. 112). Additional evidence that brain functioning influences creativity is that injury to certain areas of the frontal lobes can destroy imagination while leaving reading, writing, and arithmetic skills intact (Kolb and Whishaw, 2006). Antonio Damasio, co-founder of the Brain and Creativity Institute at the University of Southern California, has written about Elliot, a patient

who had a frontal lobe brain tumor removed. After surgery his intelligence was intact but he was incapable of making decisions. Why? Because he lost the ability to experience emotions and decision-making requires feelings. Decision-making also requires the ability to imagine possibilities, which is creative work. Could it be the tumor's frontal lobe damage also impaired Elliot's ability to create?

How do people create?

Writers are a suitable group for study when considering the process of creativity because of obvious patterns in their work. Two of these patterns are "What would happen if?" and, "Is there an alternate world?" An illustration of the former is Stephen King's novella *Rita Hayworth and Shawshank Redemption*, later made into the movie, "Shawshank Redemption" (1982). It is the story of an innocent man imprisoned for the murder of his wife. The protagonist, Andy Dufresne, is brilliant, cultured, and extraordinarily self-disciplined. In this story King is answering the question, "What would happen if such a man were sentenced to spend the rest of his life living among hardened criminals in a corrupt institution." Another fictional work, also made into a movie, is John Grisham's *A Time to Kill* (1988). It is the story of a man on trial for murdering the two men who abducted, raped, and savagely beat his 12-year-old daughter. Grisham was inspired by the question, "What would happen if a man committed murder under these circumstances?" He wondered if a jury would conclude these were justifiable homicides. Another "What if?" story is that of M. Night Shyamalan's movie "The Sixth Sense" (1999). It was America's number one box office attraction for five weeks and its ticket sales exceeded production costs by \$630,000,000. It is the story of an eight-year-old boy who has the ability to peer into another dimension of reality and see dead people.

The aforementioned *The Lovely Bones* by Alice Sebold is a novel with a similar theme (2002). Similar to the "What if?" theme is the creation of an alternate world, a concept seized upon by many science fiction writers. An alternate world is a hypothetical world different from the "real" world as ordinarily experienced by people. The science fiction writer Rod Serling, serving as the narrator of his television series, "The Twilight Zone," introduced each episode with these words: "You are about to enter another dimension, a dimension not only of sight and sound but of mind. A journey into a wondrous land of imagination. Next stop, the Twilight Zone!" (2018). H.G. Wells takes readers on such a journey in "In the Country of the Blind," the story of an isolated village of blind people for whom

sight is incomprehensible (1904). The popular movie "I, Robot" incorporates several of the ideas presented in Isaac Asimov's collection of short stories with the same title (1950). Both versions feature a world cohabited by human beings and sophisticated robots. W.P. Kinsella created a world in which long dead baseball players return to life to play the game they love in the novel *Shoeless Joe* (1982). His story is more widely recognized by its movie adaptation, "Field of Dreams."

Denouement

A story that has circulated in various forms over many years is that of Michelangelo when asked about the difficulty of sculpting his masterpiece statue of David. Michelangelo responded that actually it was very easy. "All I did," he said, "was get a block of marble, take a hammer and chisel, and chip away everything that didn't look like David." This story is a paradigm of creativity. Michelangelo is credited with having said, "Every block of stone has a statue inside it and it is the task of the sculptor to discover it" (2008). Artists are visionaries who observe the world and see things most people do not see. Michelangelo saw a statue of David in a block of marble and had the skill to convert it into what is perhaps history's greatest sculpted work. His intrinsic desire to produce what he envisioned motivated him to work constantly for over two years in self-imposed isolation. Artists, inventors, composers, and writers are driven by a compulsion to create – a compulsion that has enriched the world and continues to do so.

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